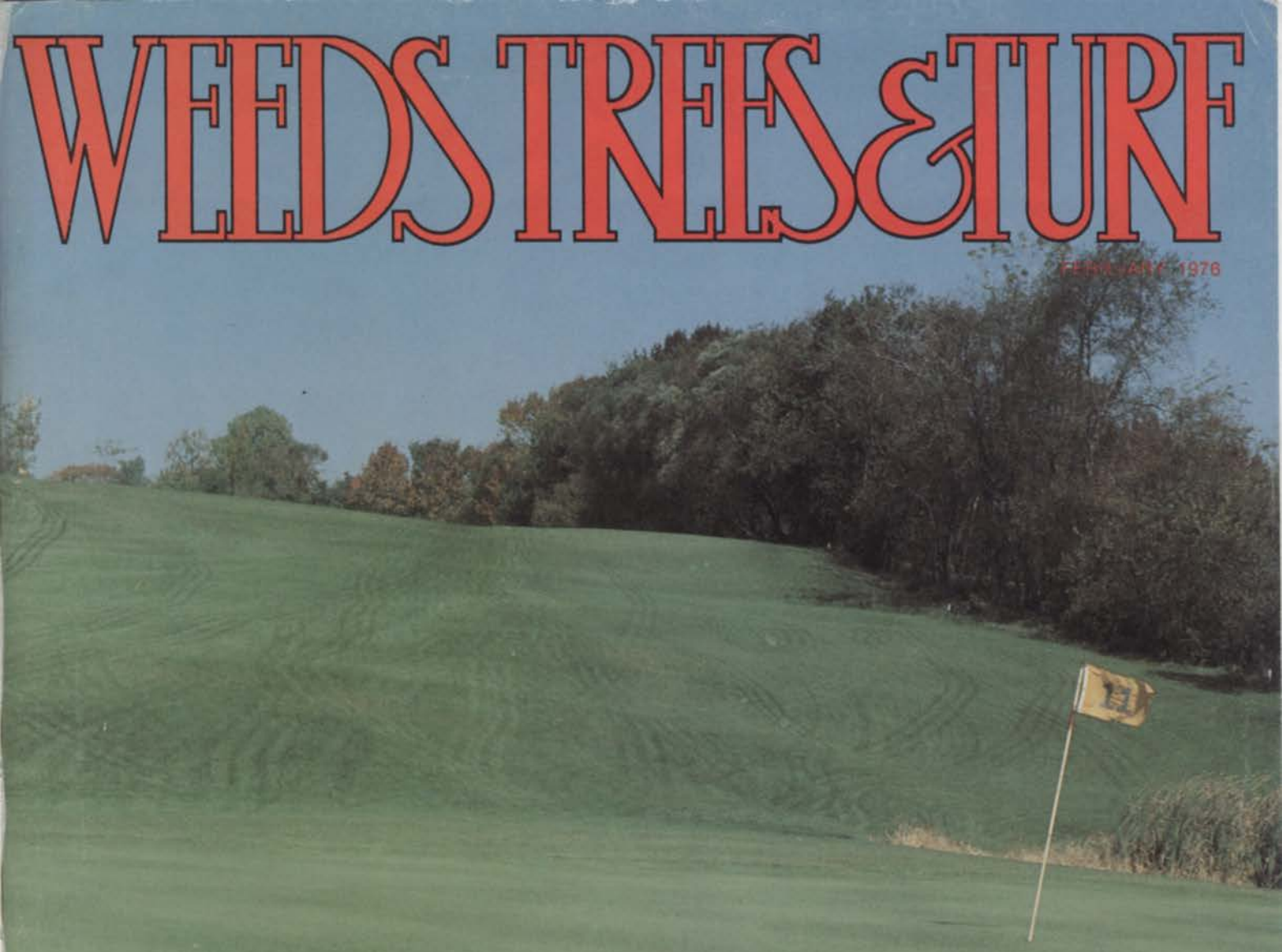
WEEDS TREES & TURF

FEBRUARY 1976



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WEEDS TREES & TURF®

February 1976, Vol. 15, No. 2

14 **A New Look For A Sidewalk** — The Cleveland Heights, Ohio city forester is involved in a tree planting project to beautify that city's commercial areas. He uses a unique method of planting the trees that is both efficient and effective.

19 **Battle of the Budworm** — Vintage World War II bombers lead the attack on spruce budworm in Maine's northern forests. Forty-six pilots flying insecticide in the 1975 operation came from as far away as Oregon, Arizona and Georgia.

23 **Sources of Nitrogen for Turf** — Here's a round-up story on the history of nitrogen requirements. The article answers questions on the various sources of nitrogen for use on the different turf varieties.

26 **Successful Sod Installation** — Any successful sod installation begins with proper site preparation, says turf specialist John Hall. And just as important is the selection of quality sod containing varieties that perform well in the climate of the area.

44 **Myth, Magic and Misconceptions** — A group of arborists traveled to the "home" of Dr. Al Shigo, the Hubbard Brook Experimental Forest Station, to get a first hand look on some of his tree wound and decay work. Shigo's work has "exploded" many of the myths that have been perpetrated through the years.

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THE COVER — The 18th green on Bill Lyon's back nine offers a view of this entire rye grass course.

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Editorial

Five years and more than a few billion dollars have brought the Environmental Protection Agency to 1976. Long ago the Agency scooped up people, funds and regulatory powers involving pesticides from the U.S. Department of Agriculture. And EPA, with what seemed like a mandate from America to clean up the environment stepped bravely into industries such as ours . . . bringing tons of its taxpayer money, reams of forms and red tape, legions of bright young lawyers and an unbelievable sea of misunderstanding.

Much of this was necessary, we said, if we are to have both a protected environment and a proper freedom for use of pesticide tools in our industry. Our industry leaders stopped fighting and started joining regulatory officials . . . working to cut down on misunderstanding.

It worked. It is working. But we still can't help but lament how troublesome, expensive, time consuming and downright irritating it is to have the problem being solved by the federal government.

Now, there's a federal law so tough that one man, the EPA administrator, can suspend uses of a pesticide with or without sufficient proof. He needs, as nearly as we can tell, only something called cause.

A few weeks ago this actually happened. The man is Russell Train. The pesticide is chlordane. And the proof wasn't there, according to EPA's own law review procedure.

Yes, we have learned some hard lessons in this pesticide business. And we may have more instruction yet to come. But, if we forget all else, we should still remember just how EPA was created and how it began to use its power. This lesson will be important to keep in mind in many other aspects of our business.

Very briefly, Congress created the EPA when large numbers of people were saying . . . "the situation is so bad that the government ought to do something about it." Large numbers of people put the power in Washington, but with no instructions on how it was to be used.

The power was to be used, we have discovered, where the most influential and strongest pointers directed. DDM

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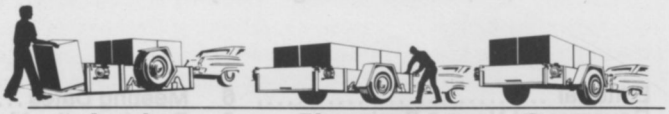
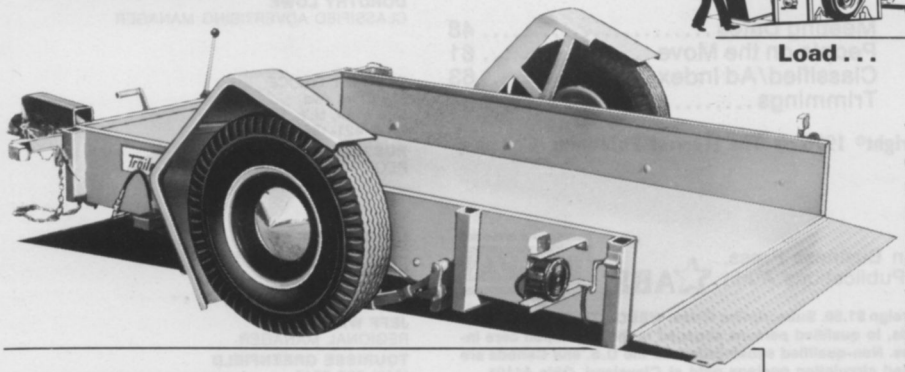


Load . . . Elevate . . . Go . . .



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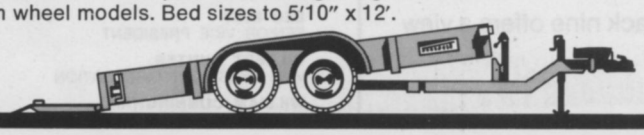

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Government News·Business

EPA boss, Russell Train, placed an immediate ban on approximately 85 percent of the uses of heptachlor and 70 percent of chlordane. He said continued production and use of these pesticides would create an "imminent hazard" of cancer in man, and that this risk outweighs the benefits of continued use. After the EPA ruling, the Environmental Defense Fund filed a petition in the U. S. Court of Appeals asking for a review of the EPA decision and arguing that the ban should be extended to all uses.

However, the law judge had said there wasn't sufficient evidence to suspend use of the chemical as an imminent cancer hazard and called the scientific evidence inconclusive. Train replied that despite the administrative law judge's comments, it isn't necessary to find "conclusively" that harm to humans will occur if the pesticides' uses are allowed. He said he found continued use of the pesticides would "likely" result in an "unreasonable risk to man."

Approximately 21 million pounds of chlordane and two million pounds of heptachlor were produced by Velsicol Chemical Company in 1974. He said residues of the pesticides have been found in human tissue, human milk and human fetuses; in air, soil and water, and in meat, fish and poultry.

Hearings will continue to determine if Train's ban should stand.

In further EPA action, Train appointed 15 public and 5 "exofficio" members to the Agency's newly created Pesticide Policy Advisory Committee. Train said its purpose was to broaden the in-put he receives from a variety of viewpoints on important pesticide actions.

Dun's Review magazine named Outboard Marine Corporation one of the 1975's 200 best-managed of 1,400 publicly held companies. The selection was based on short-term earnings performance, average rate of return on common equity over the last five years, professionalism of management, corporate planning, financial acumen and marketing strength.

Albright & Company recently announced their formation as a California-based distributor for turfgrass and flower seeds, Duraloam soil conditioner, and erosion control products.

Penn-Gro Corp. received exclusive franchise to distribute P. J. Engineering's automatic precision grinding machines for grass-cutting equipment.

The Fertilizer Institute energy survey results indicate that ammonia and phosphate producers have succeeded in trimming their needs of natural gas in all production activities. Ammonia producers have decreased their use of gas from 40,706 cubic feet per ton of ammonia produced in 1972 to 39,379 cubic feet in 1975; a drop of three percent.

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This 9-gang giant will take on the biggest mowing job you have and breeze right through it.

Grady Hassell can tell you about it. He's with Lawn & Turf, Inc. in Conyers, Georgia.

As a Jacobsen Distributor he has all the answers about Jacobsen equipment. Like the huge F20 9-gang mower.

He'll tell you that it cuts a wide 19-foot swath. It has a gargantuan appetite that can cut through 76 acres in one work day. And that's mowing at a realistic pace.

But it's easily tamed for more delicate chores because the operator can raise and lower any of the reels with a fingertip control. Things like median strips can be mowed from the road shoulder with the outboard reels, for example.

Just because it's big doesn't mean it's clumsy. Far from it.

There's a ground-gripping front drive that gives sure traction on grades and sidehills.

And the rear wheel steering means that the reels turn in the same arc as the steering wheels. No skidding, no skipping, no uneven cutting in the turns. And no wheel streaks in the straightaways, either.

If you have big mowing chores ahead of you, ask your Jacobsen Distributor about how the mighty F20 can help you. An actual demonstration ought to raise your eyebrows a couple of notches.

And you might even find yourself saying, "Now here's a mower."

Your Jacobsen Distributors.

Before we sell it, we buy it.

For the name of the distributor near you write: Jacobsen Turf Distributor Directory, 1721 Packard Avenue, Racine, Wisconsin 53403.

...the tough one, for total vegetation control!

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- Less pounds last longer!
- Gets most tough weeds and most brush others leave behind!
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Acceptability!

For the past several years, SPIKE has been tested in actual field situations with commercial equipment. When applied in accordance with label directions, SPIKE will result in a high level of long lasting total vegetation control.

Test plot demonstrates dramatic result of single application of SPIKE. ▶

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- Is remarkably resistant to leaching and lateral movement

. . SPIKE belongs in your total vegetation program.

"Before" and "after" views of the same test plot clearly demonstrate SPIKE's ability to control brush and woody vegetation. ▶

Dependability!

. . . that's what all of SPIKE'S abilities add up to. SPIKE is a proven total vegetation control product that is truly tough on weeds! What's your tough vegetation control problem? Whatever it is, consider SPIKE an essential weapon in your chemical arsenal. Contact your ELANCO distributor for full details on SPIKE . . . the tough one for total vegetation control!

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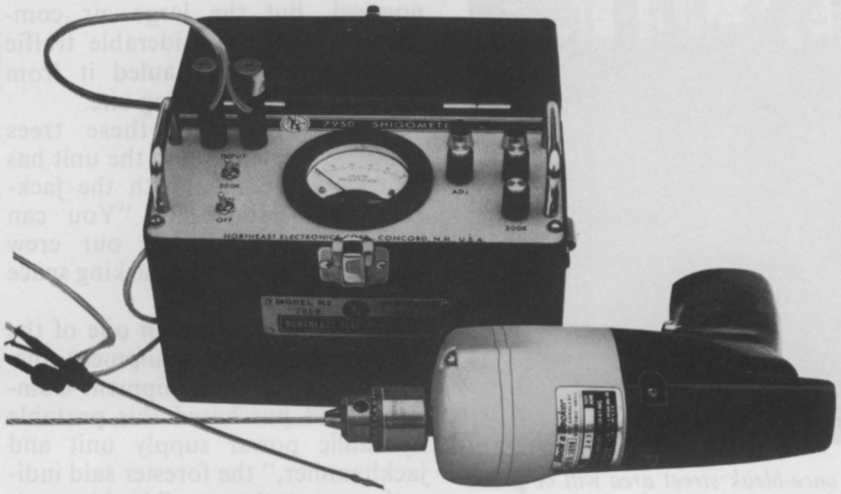

A practical, low cost instrument that pinpoints discoloration and decay in their early stages before they are evident externally. Allows time for early treatment or removal before damage to surrounding area. Ideal for utility pole, park, and recreation area maintenance, and forestry research and inspection.

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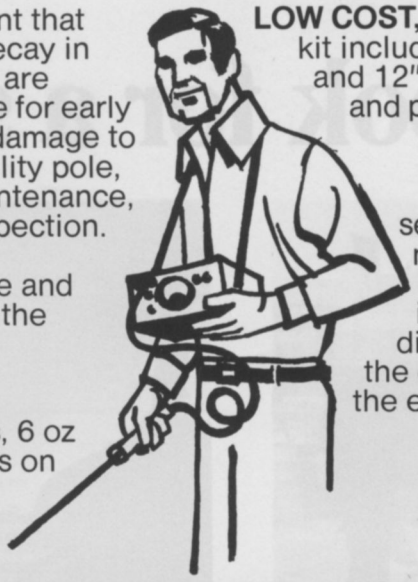

LOW COST, BATTERY OPERATED Complete kit including Shigometer, two 3/32" bits 8" and 12" long, four 8" and two 12" probes, and portable, cordless drill $414.95. Kit without drill $350.00.

The Shigometer is an extremely sensitive instrument that accurately measures any amount of ionization to provide detection of both incipient and advanced decay and discoloration. Shigometer indicates the degree of tissue deterioration and the extent of tissue damage. Complete instruction manual and 12 month warranty included with each Shigometer.

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New look for a street

CITY BEAUTIFICATION projects have enjoyed considerable popularity the past dozen years. And with bicentennial spirits now at a peak, most communities have initiated beautification projects, however small, in hopes of putting some "civic pride" back into an apathetic public.

The projects vary with the individual community but one of the more popular ones has been the planting of street trees in otherwise bleak surroundings. But those bleak areas are tree-less for obvious reasons. They're wall-to-wall concrete. No one has yet devised a tree-spade capable of planting through concrete, nor do most communities have a large enough budget to warrant major reconstruction of sidewalks.

So, with some of the more obvious and also ridiculous solutions ruled out, city beautification committees are still faced with the problem of how to plant trees in this sea of asphalt. One popular method has been the construction of large concrete planter boxes. The two-ton planters are filled with soil and a tree is planted within.

"Trees soon become root-bound in concrete planters, plus the boxes take up a lot of space on these already narrow sidewalks," said Emerich Sabo, pointing down the street at a seemingly endless row of utility poles, parking meters, mailboxes, and trash cans. Sabo is city forester for Cleveland Heights, Ohio; and has been for 10 years.

This once-bleak street area will be green and alive in years to come as these young trees grow and leaf out.

"We had to come up with an economical and practical method for planting trees in the commercial areas right through the concrete," he told WEEDS TREES & TURF. His first approach was to borrow the street department's trailer-mounted air compressor and jackhammer. This made the job economical, but the large air compressor caused considerable traffic problems as they hauled it from planting site to planting site.

"We're planting these trees about 35 feet apart and the unit has to follow the man with the jackhammer," Sabo said. "You can imagine the confusion our crew caused trying to find a parking space every 35 feet."

"I got in touch with one of the local construction equipment distributors, Gibson Equipment Company, and purchased this portable hydraulic power supply unit and jackhammer," the forester said indicating to a rather small looking unit

(continued)

Two crew members prepare to chisel a hole through the sidewalk. The portable hydraulic unit is wheeled into position.

After the sidewalk has been scored and cut, the jackhammer is used to break-up the concrete.

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LOOK *(from page 14)*

two of his crew members had just placed on the sidewalk. "With this outfit, after the first hole is cut, one man of our three man crew can roll the unit ahead and start on the next hole while the other two men put the finishing touches on the newly planted tree."

And all the industry murmers about the handiness of hydraulics have been true for Sabo. After the hole is scored on the concrete surface, a gasoline-powered Stihl saw with a special bar and blade attachment is used to cut through the concrete. The hydraulic-powered pavement breaker breaks up the inside square section of cement and the pieces are shoveled out of the hole.

The power unit and pavement breaker are manufactured by Worthington. Sabo says another advantage of the hydraulic system is its quietness.

In a normal working day, the three-man crew can plant eight trees, according to Sabo. The planting season for Sabo and his crew ranges from fall to spring. "We shovel the snow off the planting site and plant trees right through the winter," he added.

Working out the mechanical part of planting the trees proved to be a simple task compared to what happened when Sabo began planting the trees. The local merchants didn't see the same virtues in the planting project that Sabo did. He resorted to hard-sell tactics.

"When they heard we are going to plant trees in front of their stores, most merchants thought the trees would cover-up their store fronts as they grew bigger and branched out," he said. His second job was to convince the merchants that the variety of trees he was planting would not conceal their stores from passing motorists.

Sabo selected two oval-shaped varieties for the project; the Little Leaf Linden and the Emerald Queen variety of Maple. Characteristically these varieties obtain a somewhat columnar shape enhancing the neighborhood and providing an unobstructed view of the store-front area.

The total tree planting project, when completed, will include some 300 trees. And at a cost of about $75 per tree planted, that's a reasonable price to create a spirit of pride in the neighborhood and bring business back downtown. □

Sabo (right) and one of his crew members position the new tree. The trees seem to do very well when planted in this manner, according to Sabo.

The finishing touches are put on one of the newly planted trees. Before Sabo's crew leaves a planting site, they remove all debris.

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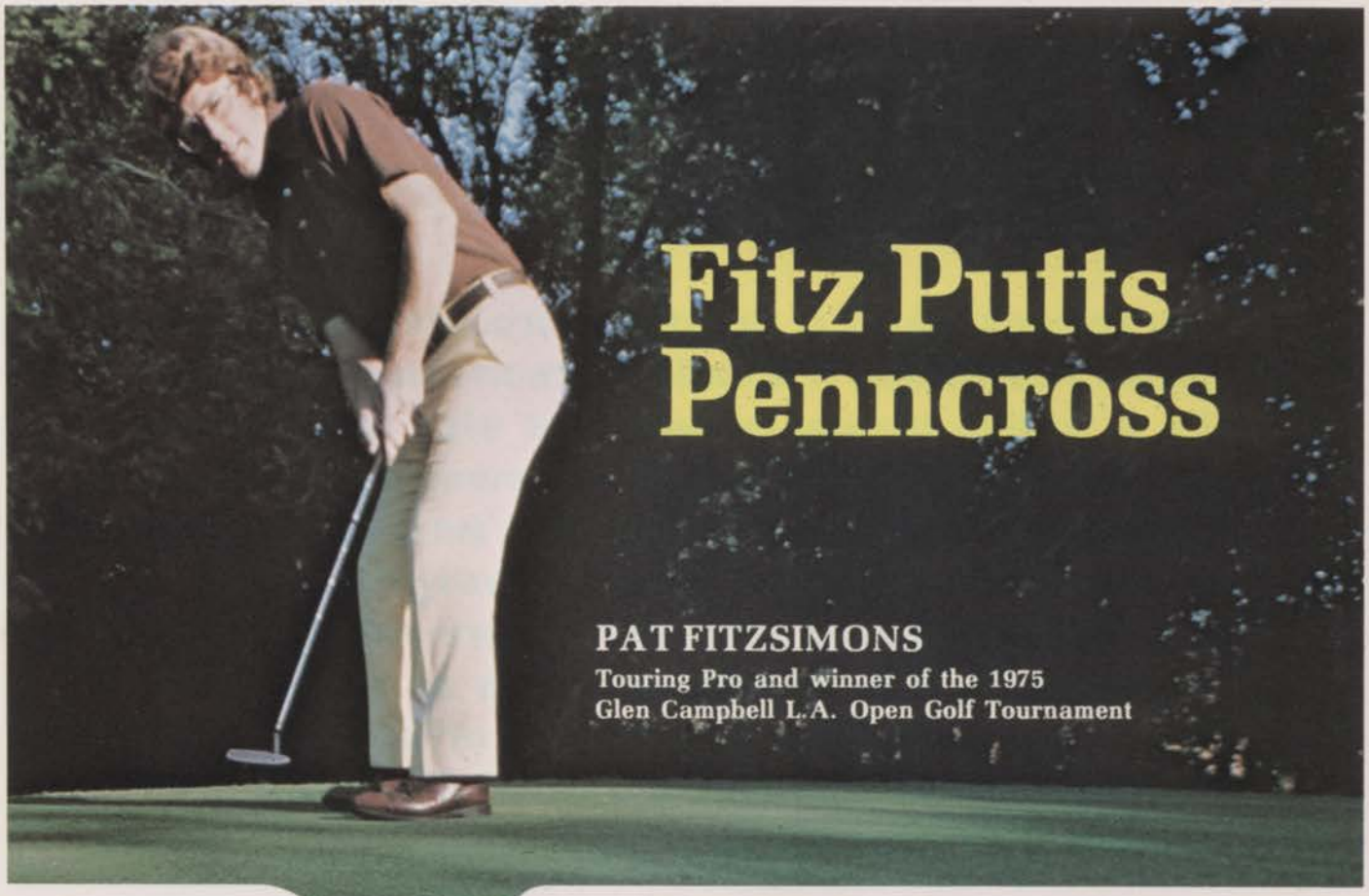

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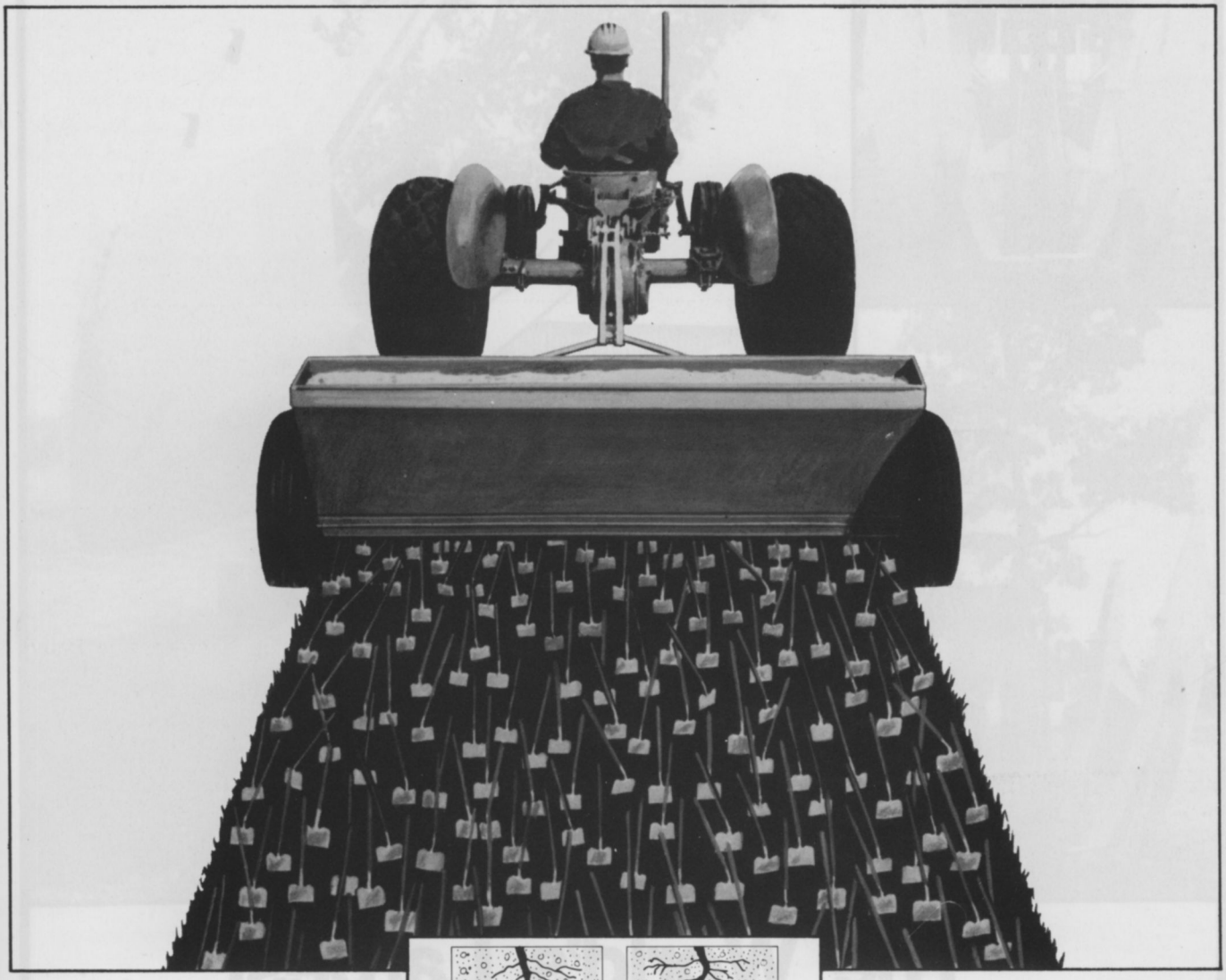

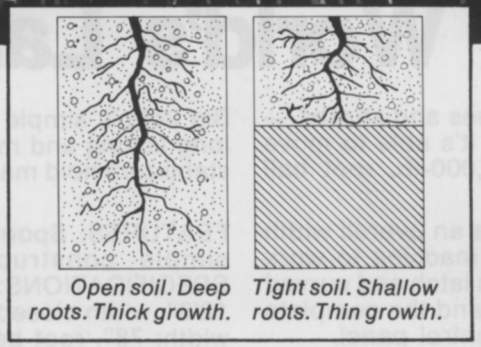

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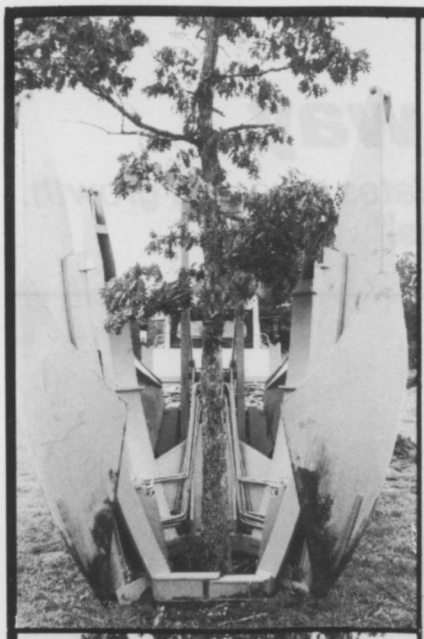

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Circle 156 on free information card

Battle of the Budworm

THE VINTAGE World War II bombers flew into the early morning darkness of northern Maine last spring to lead the attack in "The Battle of The Budworm." Loaded with insecticide instead of bombs, the planes were the tools Maine foresters used to combat the ravenous spruce budworm in the largest insecticide spray project the federal government and the State of Maine have ever mounted. This "heavy weapon" strategy is necessary, officials say, because the budworm infestation threatens to destroy nearly six million acres of northern Maine's valuable spruce and fir forest. Natural controls have not stopped the outbreak and the mushrooming worm populations are leading to even more dire predictions in the future.

The spruce budworm is a small brown moth which has been around northeastern forests for a long time — epidemics having been reported as far back as 1770. The most recent severe infestation, in 1910-1919, destroyed 27,000,000 cords of valuable spruce and fir timber. The pulp and lumber industry is Maine's most valued resource, contributing 39% of the state's economy, and the present budworm epidemic threatens to cripple it. This catastrophe would also pose problems for the many related industries dependent on this wood.

But losses of lumber are not the only consequences of budworm feeding. The recreational value of the Maine wilderness is also in jeopardy due to defoliation. Consider, too, the potential upset of the forest ecosystem: forests act as watersheds and, with a major reduction of trees, surface runoff can cause floods and erosion, further threatening the forest. Forest fires would become a more potential danger due to the number of standing defoliated and dead trees. Wildlife may also be endangered because it depends dearly on the forests for shelter, food and water.

The budworm does its damage by feeding on the buds and needles of spruce and fir trees, the fir being

John Chadwick, director of the Presque Isle, Maine, operation terms the present spruce budworm epidemic "massive."

One observer noted that this past July, moth flights were so severe that they literally had to be scraped off the roads with snow plows.

its preferred host. Early in May, the tiny larva emerges from its overwintering site called a "hibernaculum," a cocoon-like shelter on the branch of its host tree. Larval development is in six stages or "instars," each separated by a molt. The first or smallest instar occurs the previous fall and the larva overwinters in the second instar. After emerging in the spring, the larva tunnels into a spruce or fir needle and feeds by consuming the tissues within the needle. In severe epidemics such as the present one, hardly a bud or shoot can be found with no insect feeding on it. In the sixth and largest instar, the budworm larva eats more foliage than in all the previous stages put together.

In late June, the budworm pupates and emerges two weeks later as a moth. These brown moths begin to lay eggs in July. Eggs are laid in masses of about twenty, and each moth can lay up to 200 eggs in its one year life cycle. Two weeks after ovaposition, the eggs hatch and the first instar larvae spin their hibernaculum to spend the winter and begin the cycle again.

One observer noted that this past July, moth flights were so severe that they literally had to be scraped off the road with snow plows. A cloud of the insects traced by the weather bureau radar measured 64 miles long by 16 miles wide.

Control problems are compounded by the fact that many new moths are brought down on winds from Canada where over 100 million acres of forest are infested and serve as reservoirs for reinfestation in the U.S.

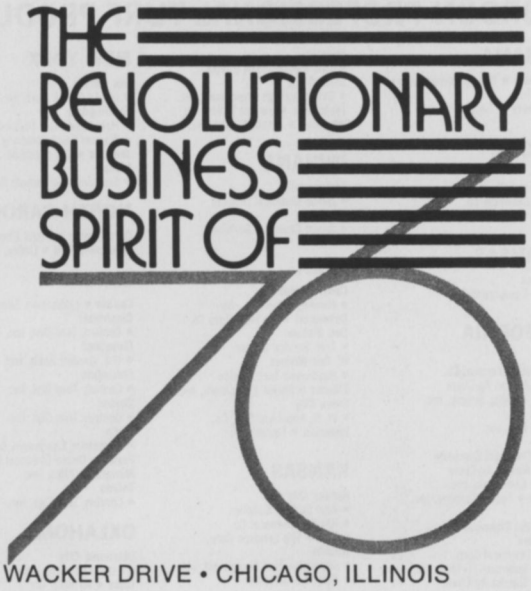
"The budworm infestation is massive," says John Chadwick, Director of the Presque Isle based spray operation, "and our control efforts are really a holding action. We can't hope to eradicate the budworm, but we are trying to keep those trees alive." Infested trees will die after two to three years of feeding and are salvageable for only a few more. Efforts are directed at controlling the moth in the fourth or fifth instar, or before the major amount of damage is done.

"We're talking about one to two hundred years for recycling these forests," Chadwick continues, "so we can't afford to let these trees die in the face of population pressures and use factors of the forest."

Spraying operations began in 1958 with the use of DDT on 320,000 acres. This chemical was restricted in Maine in 1967 and foresters began searching for new less

(continued on page 46)

Above: A vintage World War II bomber makes a solo pass over the budworm infested forest lands of Maine.



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Turfgrass managers have many alternatives when it comes to choosing a source of nitrogen for turfgrass fertilization. For many years, only soluble sources and natural organic materials were available for nitrogen fertilization, according to Donald V. Waddington, associate professor of soil science at Pennsylvania State University.

"Ureaform became commercially available in 1955 and soon found a place in many turfgrass fertilization programs," Waddington told WEEDS TREES & TURF. "The choice of slow-release nitrogen sources was limited to natural organics and ureaform until recently when IBDU, plastic-coated fertilizer and sulfur-coated urea became commercially available."

He said the choice of a nitrogen source is not limited to these materials alone. Also to be considered are the combinations available in many mixed fertilizers, which may differ widely in the source and amount of slowly available nitrogen. Good turfgrass can be produced and maintained using any of these materials, provided they are used properly. Proper use must meet the needs of the turfgrass and should be based on the properties of the material and the factors that affect the release and availability of nitrogen from the material.

Classification. Nitrogen sources can be divided into two major groups, Waddington said. The two groups are quickly available sources and slowly available sources. Quickly available sources may also be called readily available, quick-release, quick-acting, soluble or other terms that indicate rapid availability of nitrogen after application. Quickly available sources include urea, a synthetic organic, and inorganic salts containing ammonium or nitrate.

Slowly available sources, which are also called slow-release, controlled-release, slow-acting and insoluble, can be further classified according to the method by which the rate of release is controlled: (1) microbial decomposition releases nitrogen from natural organics and ureaform; (2) low solubility limits dissolution and hydrolysis, which are necessary for nitrogen release from IBDU; and (3) coatings act as physical barriers, which delay dissolution of soluble nitrogen sources used in sulfur-coated area urea and plastic-coated fertilizers.

Quickly available sources. Waddington said quickly available sources have relatively high nitrogen contents and are the least expensive forms of fertilizer nitrogen. Being water-soluble, they may be applied in solution as well as in dry form. The soluble sources have high salt indexes, thus a high potential for fertilizer burn.

"The general rule of applying no more than one pound of soluble nitrogen per 1,000 square feet in one application should be followed," he said. "On dense, close-cut turf, such as that on putting greens, one-half pound is a more reasonable limit. Because solubles are subject to leaching and because turf takes up more nitrogen than needed if given the chance, frequent applications also contribute to more efficient utilization of nitrogen. The soluble sources are hygroscopic, attracting moisture from the air, and may cake up in storage, particularly in damp areas and in unsealed bags or containers."

Inorganic salts. Examples of inorganic salts include ammonium phosphates, ammonium nitrate, ammonium sulfate, calcium nitrate, sodium nitrate and potassium nitrate. These salts readily dissolve in water and dissociate into their cation and anion components: e.g., ammonium nitrate (NH_2NO_3) dissociates into ammonium ions (NH_4+) and nitrate ions ($NO_3—$). In a process called nitrification, NH_4+ is oxidized by bacterial activity to form $NO_3—$. Plants may utilize nitrogen in either the nitrate or ammonium form, but most is taken up as nitrate. Nitrates are readily leached, but ammonium is less susceptible to leaching because it can be adsorbed by soil colloids (clay and humus).

Urea. Urea is manufactured by reacting ammonia and carbon dioxide at greatly elevated pressure and temperature, according to Waddington. Urea is water-soluble, and is quickly hydrolyzed in the presence of the enzyme ureas to form ammonium nitrogen. More than 60 percent of the urea can be expected to be hydrolyzed in one day, and hydrolysis should be complete in seven to 10 days. Under alkaline conditions nitrogen may be lost as ammonia from urea or ammonium compounds. This process, called volatilization, is also favored by low soil cation exchange capacity, dry soils and high temperatures.

Slowly available sources. Slowly available sources provide a longer duration of nitrogen release than the quickly available sources, he said. They are safe from the standpoint of burn, and may be applied at higher rates and with less frequency than the solubles. The efficiency of slow-release materials is often low in the first year or two of use. They are more expensive than the solubles.

"We have evaluated many slow-release sources at Penn State and

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Successful Sod Installation Begins With Proper Selection

By J. R. HALL, Turf Specialist, University of Maryland

IT SEEMS that one of the major problems is the sod industry today is improper installation of sod. Sod producers in Maryland are producing some of the highest quality sod in the United States and yet year after year the industry is plagued by a small percent of sodding failures. Admittedly, some of these failures can be accounted for by the very nature of the difficult climate present in the transition zone. The months of June, July and August provide brutal conditions for transplanting sod, yet with appropriate care sod can be successfully installed.

Any successful sod installation starts with the proper selection of quality sod containing varieties that perform well in the climate of the area. After the appropriate sod has been selected, the site for installation must be adequately prepared. The sod must be properly harvested and rushed to the site for immediate installation. After immediate and proper installation, the sod must be placed on a long range turfgrass management program designed specifically for the sod selected.

The selection of quality sod in Maryland can be a difficult job for the amateur. There are basically three types of sod available in Maryland: 1) non-cultivated sod, 2) cultivated sod and 3) certified sod. Non-cultivated sod is grass that is harvested from fields that were not seeded primarily for sod production. This type of sod is what used to be termed "Pasture sod". It is generally very cheap, of very poor quality and certainly not a good buy. It is often the type of sod used in situations where specifications are so loosely written that anything green would suffice. The probability of ever producing quality turf from pasture sod is minimal and would have to include the cost of herbicides and overseeding with improved varieties.

Cultivated sod is produced specifically for sale as sod. There are several types of cultivated sod on the market ranging from very poor quality to very high quality. The determination of this quality is left to the judgment of the consumer.

Certified sod is sod produced under the supervision of the Maryland Department of Agriculture. Production fields are inspected for weed problems by Department of Agriculture officials before seeding and at intervals prior to sale of the sod for other pests. Certification guarantees genetic purity of the seed used and insures that the sod meets the rigid quality standards set by the Maryland Department of Agriculture. The inspection program demands good cultural practices during production of the sod and guarantees the sod is free of undesirable weeds and harmful insects and diseases at the time of harvest.

Adequate site preparation is no less important than sod selection, but somehow is often neglected. There is a common misconception in the industry that areas to be sodded do not require the same preparation as areas to be seeded. Soil preparation for sodding or seeding is the same. Improper sodbed preparation is a common cause of sodding failure in Maryland.

Sodbed preparation when the soil is too moist results in compacted soils not conducive to sod rooting. Plows, disks, cultimulchers and rotovaters are all good implements for sodbed preparation. Use of rapidly revolving rotary tillers is generally discouraged because they tend to churn the soil to the point that the soil structure is destroyed. If topsoil has been added or replaced on the area, it should be blended with the soil beneath to avoid layering. Complete tests of areas to be sodded are essential and will provide specific recommendations to correct fertilizer and lime deficiencies.

If soil tests indicate either a lime or phosphorus deficiency it is essential that the corrective amounts be incorporated in the seedbed to a depth of 4 to 6 inches. Both phosphorus and lime do not move rapidly downward in the soil and, therefore, incorporation is essential at the time of sod installation. When a complete soil test has not been made it is advisable to disc in the equivalent of 12-15 pounds per 1000 square feet of 0-20-20 and 50 pounds of limestone or its equivalent per 1000 square feet.

A starter fertilizer should be applied and worked into the surface inch of the soil just prior to installation. This starter fertilizer should provide one pound of nitrogen, 1.5 to 2 pounds of P_2O_5 and 1.5 to 2 pounds of K_2O per 1000 square feet. Studies have shown that at normal levels of nutrition there is no difference in root production between soil applied and sod applied starter fertilizer. These same studies indicate that soil moisture content at all time of sod transplanting is very important. During hot periods rooting has been show to be delayed 11 days when sod was installed on air dry soil as opposed to mositened soil. This delay in rooting occurred even when the sod installed on air

(continued on page 28)

none have produced high quality turf throughout the growing season with only one application," he said. "Some treatments have come close and perhaps would be acceptable to some of the less-demanding users. However, it seems that at least two applications, some times more, should be used to give more efficient utilization of applied nitrogen as well as good season-long color without periods of excessive growth."

Natural organics. For the most part, these materials are by-products from the plant and animal processing industries or waste products, he said. Considerable variation exists in the properties of different materials, and even within a given material. The natural organics can be characterized by relatively low nitrogen content, the presence of water-insoluble nitrogen and nitrogen release intermediate between that of soluble nitrogen sources and ureaform. Examples include hoof and horn meal, fish scrap and meal, seed meals, dried manures, and the two types most commonly associated with turf fertilization — activated sewage sludge and process tankage.

According to Waddington, release of nitrogen is dependent on microbial activity. Factors influencing release are the chemical composition of the material and environmental conditions that influence microbial activity. Protein sources of nitrogen are relatively easily decomposed. Leather, feathers, hair, hoof and horn contain resistant compounds and are usually treated with steam, and some times acid, to hydrolyze the resistant forms of nitrogen. Environmental conditions influencing breakdown of natural organics include temperature, moisture and oxygen, soil pH, and available minerals.

The said guidelines for use are as follows: on lawns, athletic fields, fairways and similar areas, use three applications per season — summer, winter, fall — one to two pounds of nitrogen per thousand square feet per application depending on species and use of area. Cut back on the summer application to cool-season grasses in warmer climates and omit summer application on non-irrigated, dormant turf. On putting greens use monthly applications of one to 1 ½ pounds per thousand square feet or apply ½ pound per thousand square feet every two to three weeks. "The latter timing doesn't offer a labor savings over the use of solubles. When turfgrass response to a normal application has been delayed due to cool or dry conditions, do not apply more natural organics," Waddington said, "because when the limiting condition ends, both applications may release excessive amounts of nitrogen. Use a light application of a soluble fertilizer to get response during the limiting period, rather than loading up the area with more slow-release. This advice applies to the use of other slow-release fertilizers."

Ureaform. Ureaform is made by reacting urea with formaldehyde. Ureaform is not a single compound, but is composed primarily of a mixture of straight chain polymers. Ureaform contains 38 percent nitrogen and about 70 percent of this nitrogen is water-insoluble. Ureaform can be divided into three, almost equal fractions based on solubility.

He said fraction I is soluble in cold water and contains unreacted urea and the short-chain methylene ureas — methylene diurea and dimethylene triurea. Availability of nitrogen in this fraction is similar to that of soluble sources, but it is not as quickly available. Fraction II is made up slow-release, intermediate-length polymers — trimethylene tetraurea and tetramethylene pentaurea. It is insoluble in cold water, but soluble in hot water. Fraction III is insoluble in both hot and cold water and is made up of pentamethylene hexaurea and longer-chain polymers. It is the most resistant fraction. In a 1967 study by G. C. Kaempffe and O. R. Lunt, the breakdown of these fractions was studied over a period of 26 weeks. After this time period, four percent of fraction I, 25 percent of fraction II and 84 percent of fraction III remained in the soil. The slow decomposition of fractions II and III accounts for the low efficiency of ureaform in the initial years of use. With continued use and build-up of ureaform, recovery of applied nitrogen improves.

"Release of nitrogen from ureaform is dependent on microbial activity and the same environmental factors that affect release from natural organics also affect release from ureaform," Waddington said.

He said ureaform is sold as "Uramite" by DuPont and a "Nitroform" by Hercules. It is available in granular form and in a powdered form suitable for spraying. "At Penn State we have not measured significant differences in response to the two particle sizes," he said. "Two applications a year in spring and fall give good results. It is usually necessary to supplement with solubles or use higher than normal rates in first years of use. If necessary, supplement with ¼ to ½ pound nitrogen per thousand square feet from solubles during periods of low release."

IBDU. Isobutylidene diurea is made by reacting isobutyraldehyde and urea. It is produced by Mitsubishi Chemical Industries in Japan, and is distributed in the United States by Swift Agricultural Chemicals. It contains 31 percent nitrogen, of which 90 percent is water-insoluble. Release is slow due to low solubility; but once in solution, IBDU is hydrolyzed and releases available nitrogen. Particle size has a large effect on release of nitrogen, with smaller particles releasing more quickly. Release also increases with increased soil water content. Release is also affected to some degree by temperature and pH. Hydrolysis is faster under acidic conditions. The rate of release also increases with temperature, but low temperature does not affect IBDU as much as it does those sources dependent on microbial activity for release.

"Our work with IBDU was started in 1966," Waddington said. "We have observed a three- to four-week delay before obtaining response from IBDU applications on Kentucky bluegrass, but not after applications to an aerified and topdressed green. Probably the close contact with wet soil and more liberal irrigation practices enhanced release on the putting green." If the delay in response is considered objectionable, he said, a soluble nitrogen source can be used to supplement the IBDU.

"We have observed early spring

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SOD *(from page 26)*

dry soil was watered to wet the soil under the sod immediately after installation (1). Obviously, waiting 11 days for sod to root in the middle of summer may be the difference between success and failure.

Properly harvested sod should contain approximately ¾ inch of soil. Standard size sections of sod should be strong enough to support their own weight if picked up by any end. Quality sod should not be harvested during periods when moisture content (excessively dry or wet) may adversely affect its survival. Sod should be harvested, delivered and installed within a period of 36 hours.

As noted earlier, during periods of high temperature, it is beneficial to lightly irrigate the soil immediately prior to laying the sod to cool and moisten the soil. The sod should not be stretched or overlapped and joints should be closely butted together. On sloping areas where erosion may be a problem sod should be laid with staggered joints, rolled and secured by pegging. All sod should be rolled and watered immediately after installation to prevent drying and remove air pockets. This irrigation should thoroughly wet the sod and the soil under the sod.

The sod should receive water daily until adequate root systems are developed to support the grass plants. The first mowing should not occur until the sod is firmly rooted and secure in place. Not more than 1/3 of the grass blade should be removed by the initial or subsequent cuttings.

After the sod has successfully rooted and established itself, it should be placed on a rational fertilization program corresponding to most university and industry recommendations.

Following these simple but essential steps for proper sod installation will considerably decrease sodding failures. □

Reference 1) King, J. W. and J. B. Beard. 1972. Agronomy Journal 64 (3):259-262

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NITROGEN *(from page 24)*

greening with IBDU and nitrogen recovery from IBDU exceeded that from ureaform during the initial years of use," he said. "Two applications in spring and fall have given good results on both bentgrass and bluegrass. On bluegrass we found no advantage to three applications. A single spring application had a longer residual effect than a single fall application."

Plastic-coated fertilizer. Sierra Chemical Co. uses the "Osmocote" process to produce plastic-coated fertilizers, he said. In this process, plastic coatings, also called resin or polymeric coatings, are applied to soluble sources of nitrogen, phosphorus and potassium. For release to occur, water passes through the coating and dissolves the fertilizer salt. This causes pressure which swells the capsule, and the dissolved salts diffuse out through enlarged pores in the coating.

Different coating thicknesses are used to obtain different release patterns, he said. The thicker the coating, the slower the release. Release increases with increased temperature. If coatings are ruptured or cracked by mechanical damage or due to prolonged, excessive drying, release rate increases. The release rate is not significantly influenced by soil moisture levels, volume of water applied, soil pH, or microbial activity.

"The number of applications required is dependent on the formulation," Waddington said. "We used a six-month formulation on a putting green and performance fell short of six months. At lower temperatures the same formulation would be expected to last longer. We applied the fertilizer after aerification on the green to minimize mower damage to particles. After a single application of six pounds nitrogen per thousand square feet on fairway bentgrass, we observed turf damage when coated sources were damaged by tractor and mower traffic."

Sulfur-coated urea. Sulfur-coated urea is made by spraying preheated urea granules with molten sulfur. Sometimes a wax coating is then applied to seal pores in the sulfur coating. In some experimental formulations using wax, a microbicide was used to slow microbial decomposition of the wax. Nitrogen is released from sulfur coated urea by degradation of the coating and/or diffusion of soluble nitrogen through pores in the coating.

"Release rate is affected by coating thickness and temperature," he said. "The formation of ferrous sulfide on sulfur-coated urea under water-logged conditions also slows release of nitrogen. As with plastic-coated materials, breakage of the coating increases release."

He said the seven-day dissolution rate in water is commonly used to characterize different formulations of sulfur-coated urea. The Tennessee Valley Authority has done considerable development and agronomic work with sulfur-coated urea. Imperial Chemical Industries, Ltd., of England is commercially producing sulfur-coated urea under the trade name of "Gold-N". It contains 32 percent nitrogen, and was available in the United States during 1974. "We have had very good results with this and some TVA experimental formulations in our research," he said. "Some of the heavily coated materials did not give very good performance in the first year of use. However, other researchers have shown that these types release in later seasons." □

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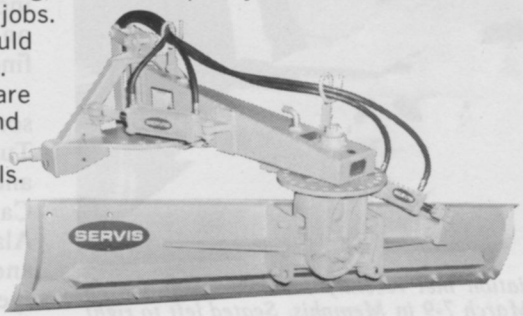

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Kickback Selling A Question In Industry

Most salesmen come in contact with kickback selling sometime in their career, according to an editorial in a recent issue of the newsletter of the Indiana Golf Course Superintendents. The thoughts have something to offer for many in the green industry.

"Rumors play a part in kickback selling," the editorial said. "Periodically one branch of business or industry is singled out. Such and such company's salesmen are resorting to kickbacks to their buyers. However, try to track down these rumors, and speaking for the majority, one will find no substance to them. Any attempted shakedown efforts end in smoke. Those complaining are usually limiting their utterances to saying, 'there is far too much kickback going on.' And that is not enough to lend any amount of credibility to the matter.

"Of course, no salesman is so naive as to kid himself that this type of thing does not occur. It does. Some salesmen in effect have tramped into some pretty luscious cases. And were it not for the law of libel and related troubles, one would surely hear some outstanding facts.

"In the long run it is not lucrative for any salesman to relent to unethical selling tactics. For a buyer who can be bought by anyone with a bribe can be bought by everyone. Thus he is open to many bids. The next salesman making his appearance may very well outbid the former one. Opposition to greasing the buyer's palm whether by outsized Christmas presents or outright bribery should be maintained under all circumstances.

"It is entirely unnecessary to try to offer a counterbribe for an account that is 'sewed up", so to say. Over a period of time no account is out of reach for a good salesman. If he waits, he will find that someday someone in the know gets tired of the implication of bribery and throws the doors wide open for a change to walk in.

Kickbacks draw their own fierce competition. The sky is the limit. Once a sales person starts on such a strategy, he may not be able to keep up with its eventual cost to him, or he will be exposed. One way or the other, he will be the loser. Then it is too late. The business that outlasts all others is built on honest, sound principles.

Officers of the Southern Turfgrass Association met recently to make plans for the Southern Turfgrass Conference and Show March 7-9 in Memphis. Seated left to right, Sam Locke; George Burgin; Al Frenette, vice president; Gene Baston, president; Euel Coats, executive secretary; Carter Huff; standing left to right, Lee Strebel; Pat Ardoin; Kayo Mullen; Billy Smith; Jim Bridges; Frank Morrow.

Getting Landscape Contract From Government Explained

The U.S. General Services Administration has published a brochure which describes how landscape architectural firms receive government contracts.

Research, analysis, site planning and the evaluation of exterior environments are some of the services GSA requires of landscape architectural firms. Those wanting a copy of Landscape Design Services should write: Director, Special Programs Div., Room 5338, U.S. General Services Administration, 18th and F Streets, N.W., Washington, D.C. 20405.

Beard, Butler and Turgeon To Speak In California

Acceptance by three of the nation's leading turfgrass research scientists of program assignments on the 1976 Southern California Turf and Landscape Institute agenda has been announced by Victor A. Gibeault, program committee chairman.

According to Dr. Gibeault, University of California cooperative extension horticulturalist, Dr. James Beard, Texas A & M University; Dr. Jack Butler, Colorado State University; and Dr. Al Turgeon of the University of Illinois all have indicated they will attend and report on their recent turfgrass research findings.

The educational event, co-sponsored with the Southern California Turfgrass Council, will be April 28 and 29 at the Royal Inn, Anaheim, Calif. Institute co-chairmen are Alan M. Dennis, SCTC president and John Van Dam, UCCE turf specialist in Los Angeles and San Bernardino counties. Last year's institute attracted nearly 700 registrants.

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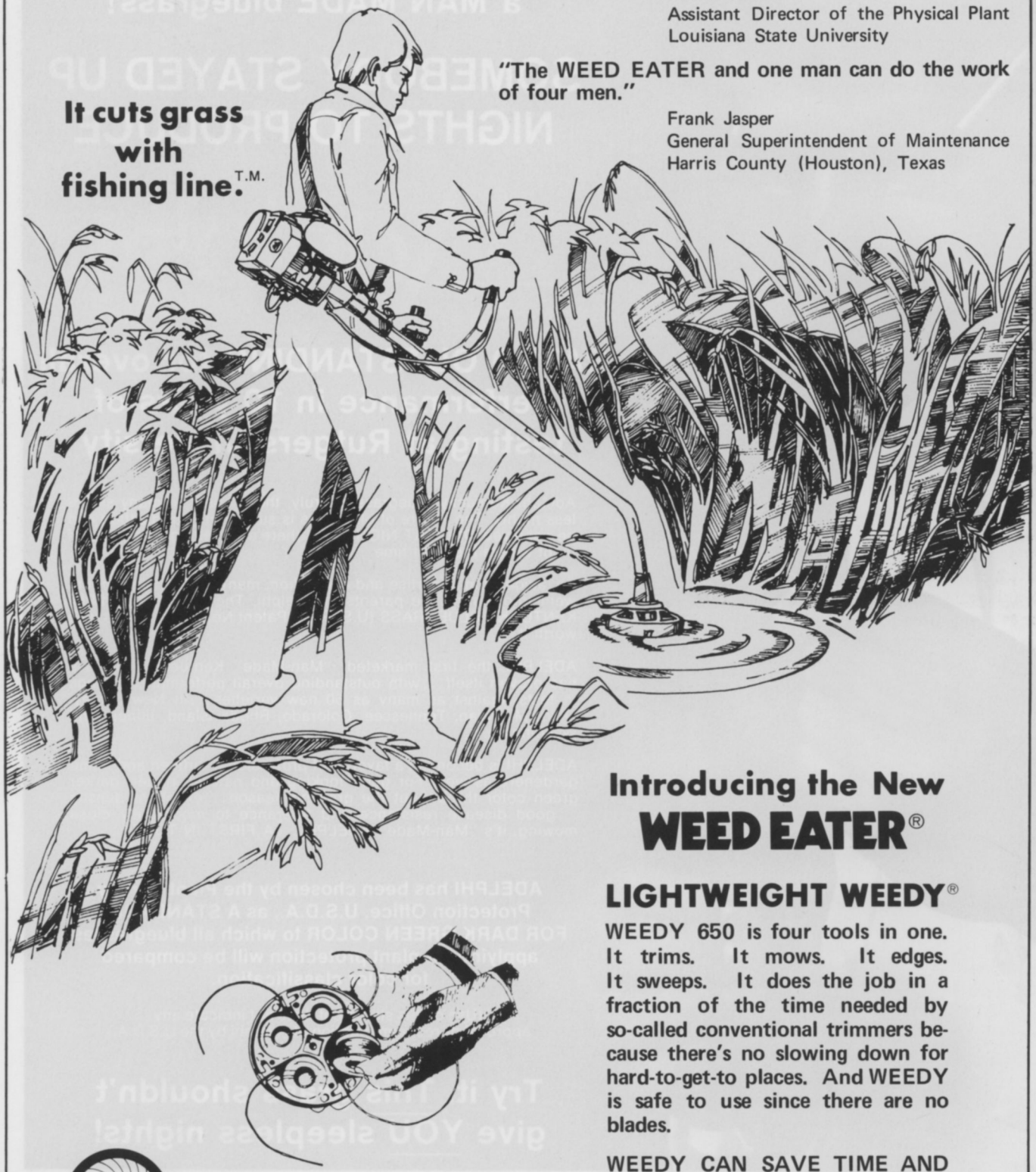

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Sulfur-Coated Urea Use Cuts Fertilizer Losses

A recent study compared uncoated and sulfur-coated ureas for ammonia volatilization losses and nitrogen recovery by coastal bermudagrass and the results showed ammonia losses for sulfur-coated ureas were a fraction of those from uncoated urea.

Research at the Texas Agricultural Experiment Station showed the coating, wax and microbicide (a suppressant to cut microbe breakdown) reduced losses to two percent. But urea coated only with sulfur lost six percent of its nitrogen. And in further contrast, volatilization losses from ordinary urea totaled 54 percent.

Tillage prior to urea addition resulted in a significant increase in NH_3 loss. Sprinkle irrigation immediately following urea application substantially reduced NH_3 losses. Dry matter yields and nitrogen recoveries by coastal bermudagrass were improved by tillage following urea addition. Nitrogen recovery percentages for topdressed sulfur-coated urea were 23 percent higher than for uncoated urea applied to the surface.

The top Hahn Turf Div. distributor in sales last year was Rhodes Turf Equipment Co., Southampton, Pa. At the recent Hahn sales meeting, Vollie Carr, (center) presented the award to John Mickel (left) and Bill Steltz of Rhodes.

Green Survival Slide Show Available from Nurserymen

The American Association of Nurserymen has announced a new, revised edition of its Green Survival slide/sound presentation. Directed to the general public, the audio/visual program explains to the consumer the many small steps he can take to improve the quality of his life through the proper use of plant materials.

According to an AAN spokesman, the presentation can help make nursery industry businessmen community authorities on environmental improvement. The spokesman said it is ideal for showing to civic groups, schools, garden clubs, etc.

Copies of the presentation may be obtained for $35 from the AAN, 230 Southern Building, Washington, DC 20005.

Possible New Mower Rules Could Raise Unit Prices

If his foot slips and the lawn mower operator loses a toe, should the government try to put a price tag on his suffering? That is the central question confronting the Consumer Product Safety Commission as it considers proposed safety standards that could cost mower buyers a bundle.

The standards would require "dead man controls" to stop mower blades when the operator's hand left the handle; improved shields to reduce injuries from blades and objects thrown by the blades; improved protection against burns and electric shock; improved mufflers and brakes and more stable mowers. The Outdoor Power Equipment Institute, the national trade association representing power mower makers, told the commission the proposed standards would hit consumers with $368 million in higher mower prices during the initial year, hurt sales, put a number of manufacturers out of business and impose costs 10 times higher than any benefits. The commission should complete deliberations and formally propose the mower standards later this month.

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NEWS *continued*

Pen-Gro Is Distributor Of Ransomes Machinery

Ransomes Sims & Jefferies of England has announced Pen-Gro Corp., South San Francisco, Calif. is exclusive distributor of its grass machinery and replacement parts in California, Nevada and Arizona.

Frank De Carli, Pen-Gro president, recently returned from England where details of the distributorship were finalized.

Pen-Gro pioneered the sale of hydraulic gang mowers in the United States since 1970, De Carli told WEEDS TREES & TURF. He has been responsible for the development of the hydraulic verticut system for turfgrass applications and originated the floating-type action head which now has been adopted by Ransomes, he said. The company recently moved to larger headquarters at 233 Ryan Way, 94080, to provide room for the new line.

Nursery Grower Industry Is Booming Across Texas

A recent study of the Texas nursery industry proves interesting to nursery people across the country, because of various statistics.

Nursery sales in Texas are estimated at more than $55 million for 1973 by Dr. H. B. Sorensen, an agricultural economist for the Texas Agricultural Experiment Station. He studied the types of businesses, sales volumes and production of nursery industries in Texas. He identified three groups in the nursery industry — growers, dealers and florists.

"Nursery growers produce over 50 percent of the plants they sell and sell over 60 percent of all plants wholesale," he told WEEDS, TREES & TURF. "Most growers sell to other nurseries, garden centers and landscape architect firms."

He said 45 percent of all sales are made within a radius of 50 miles. About 31 percent are made over a 200-mile radius. "Of the 455 nursery growers listed in the 1972 Texas Floral and Nursery Directory, 73 percent are individual proprietors," he said. "Partnership and corporation forms of operation are about equally prevalent after individual proprietors."

"According to the report, the average individual proprietor does about $81,000 worth of business per year while the average corporation's yearly business volume is about $470,000. In addition to the nursery growers, there are almost 5,000 licensed nursery dealers in Texas. He said there has also been an overall increase in business among nursery firms.

"In the three years since 1971, 71 percent of the firms reported a difference in business volume. About 85 percent of these reported an increase in business and 15 percent reported a decrease. Almost 60 percent said they expected an increase in business in the next three years."

Sorensen said the most common type of plants grown in Texas nurseries are deciduous shrubs, which make up about 35 percent of all plants grown. Shade and ornamental trees and broadleaf evergreen shrubs are almost equally common.

U.S. Tall Fescue Seed Crop Reported Down 10 Percent

The forecast U.S. total production of tall fescue seed is at 94.9 million pounds, 10 percent below the 1974 crop, according to the Crop Reporting Board.

Average yield per acre nationally is 272 pounds in 1974 and 291 pounds in 1973. Total acreage expected to be harvested, however, is down 17 percent from 1974. In Oregon, the 1975 tall fescue seed crop is forecast at 10.2 million pounds, about the same as last year's final production of 10.1 million.

Yield per acre in Oregon is expected to be about 730 pounds, compared with 630 in 1974, but a 12 percent reduction in acreage in Oregon has offset gains made by higher yields. Total U.S. carryover of old crop seed on June 30 is estimated at 27.4 million pounds, which is the second highest carryover on record, it was reported in the newsletter of the Mid-Atlantic Association of Golf Course Superintendents.

For ad on following page Circle 109 on free information card ▶

42nd Iowa Superintendents Turf Conference Next Month

An impressive list of speakers will headline the 42nd Annual Iowa Golf Course Superintendents Association Turfgrass Conference March 8-10 at the Scheman Center, Iowa State University, Ames.

Dr. Fred Grau will be keynote speaker for the "Pioneers in Progress" bicentennial program featuring many nationally known speakers who spoke at many of the previous conferences. Other speakers include Howard Kaerwar of Northrup, King & Co., Minneapolis; Dr. William Daniel of Purdue University; Marvin Ferguson of Agri-Systems of Texas, Inc., Bryan, Texas; Robert Moore of Aquatrols Corp. of America, Pennsauken, N.J.; Lee Record, mid-continent director of the United States Golf Association Green Section; and Jerry Claussen, Rocky Mountain regional consultant for the National Golf Foundation.

The conference is expected to have more registrants than ever before, and a unique feature will be a "consult with the expert" evening at the Holiday Inn in Ames where there will be a chance to consult with experts on turf problems. The session will be March 8.

Proposed Plant Labeling Before Senate Committee

Industry representatives testified against a proposed Federal Trade Commission plant labeling requirement at a recent hearing before the Senate Committee on Government Operations' Subcommittee on Federal Spending Practices, Efficiency and Open Government.

Mayo J. Thompson, former commissioner of the FTC told the subcommittee: "Decorating the nation's plant life with a set of bureaucratically ordered care tags would have about as much usefulness to the American public as a pair of socks on a rooster," it was reported in a recent copy of *Update*, an American Association of Nurserymen report. Thompson seriously questioned the FTC's cost-benefit analysis of regulation and concluded that proposed rule "will be ineffective and impose some heavy costs" on both FTC and public at large. Thompson said enforcement of the rule would be costly and as a practical matter, virtually impossible.

Robert F. Lederer, executive vice president of the Nurserymen association, said: "Should the proposed rule be instituted, the industry would be required to provide information which could not, in fact, be substantiated. This, coupled with the attendant increase in price of the product to the consumer would serve no useful purpose."

Regarding plant toxicity labeling, Lederer labeled as misleading an FTC statement that recorded cases on ingestion of potentially poisonous plants by children exceed 12,000 a year. The National Clearinghouse for Poison Control Centers, to which the statistic has been attributed, noted that the number of individuals actually treated totals only 70 each year.

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Expert Says Better Trees Will Boost Forest Output

The results of tree improvement started over 20 years ago are beginning to be seen in many southern states. Improved quantities of better pulp or lumber will be the pay-off for this long-range research, according to Robert L. Haney of the Texas Agricultural Experiment Station, Bryan, Texas.

"Trees are like people," Haney told WEEDS, TREES & TURF, "they have a long life cycle and don't begin to mature until they are about 20 years old." He said the need for tree improvement is urgent. A recent report by the Southern Forest Resource Analysis Committee concluded the South must produce more than half of the nation's wood products by the year 2000.

"This means the annual growth of timber now being established for future harvesting must be double what it is today," he said. "And this must be done even though the amount of land available for forests is expected to be much less."

Hopes for achieving this ambitious goal hinge on identifying and culturing the best of what nature provides, according to Dr. J. P. van Buijtenen. He is a professor with the experiment station at Texas A & M University and principal geneticist with the Texas Forest Service.

New officers of the Philadelphia Association of Golf Course Superintendents recently elected. From left, Daivd C. Holler, Gulph Mills Golf Club, secretary; Louis J. Amadio Jr., Philadelphia Electric Co. Country Club, vice president; John A. Segui, Waynesborough Country Club, president; David L. Linde, Wedgewood Golf Club, treasurer; and William Milsop, Old York Raod Country Club, sargeant-at-arms.

"The first step is to convert part — not all — of our forest land into intensively managed plantations," he said. "These sites must be cleared to accomodate machines used in planting, plowing and fertilizing. Such preparations are costly — more than $40 to $80 an acre. Therefore, tree growers must be sure the trees they plant will grow fast and reproduce as much wood as possible on a small number of acres. Our tree improvement programs supply these needed trees."

The need to breed superior trees has long been recognized by a number of southern state agencies which established extensive tree improvement programs. For instance, more than 20 years ago, the Texas Forest Service started a long-range test of parent trees originally selected from wild forest populations. For some time, grafts of these selections have furnished the Service with critically needed seed that was thought to be superior.

Now, plantings are finally old enough to show their real genetic worth. And they are providing new trees for another generation of selection. The oldest trees are now 60 to 70 feet tall, and are a good indication of the increased yields that can be expected from using seed from superior trees. Although volume growth differs widely among individual tests, increases of 10 percent are common, while occasionally, increases of as much as 50 percent are found.

During the past 20 years, southern tree breeders have concentrated most of their efforts on breeding pines with the following traits — all-around good form and growth rate; high volume production; drought resistance; low wood density, desired for some type of pulpwood, such as newsprint; and high wood density desired for many types of pulpwood.

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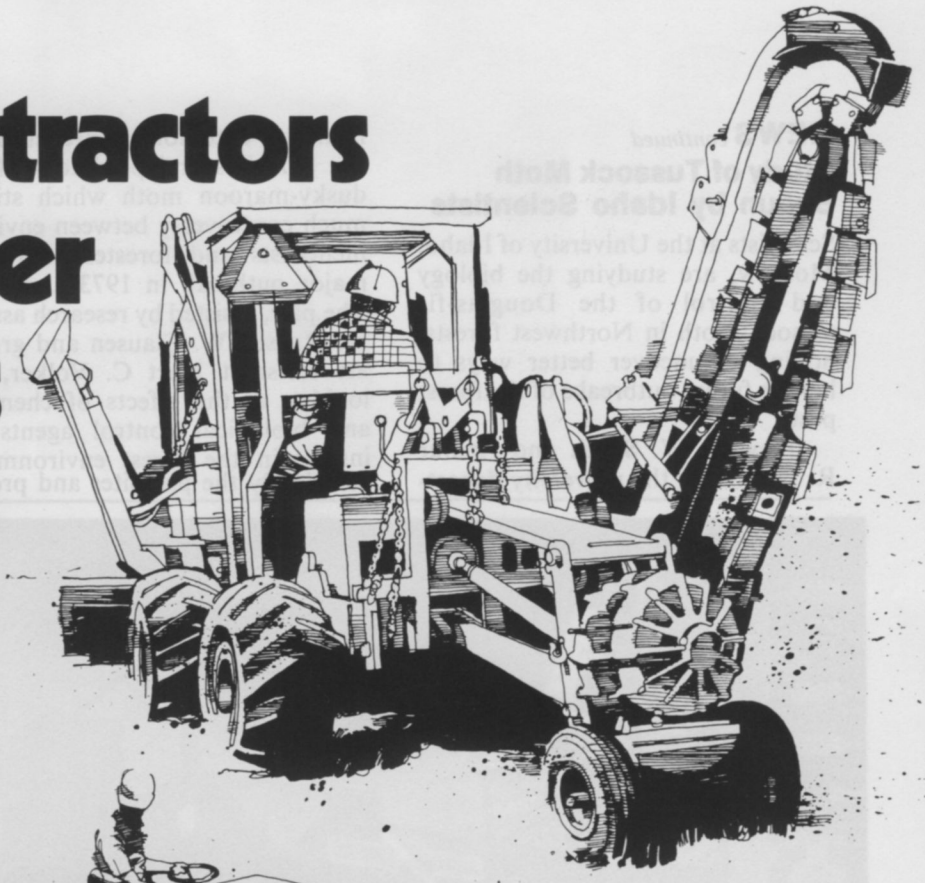

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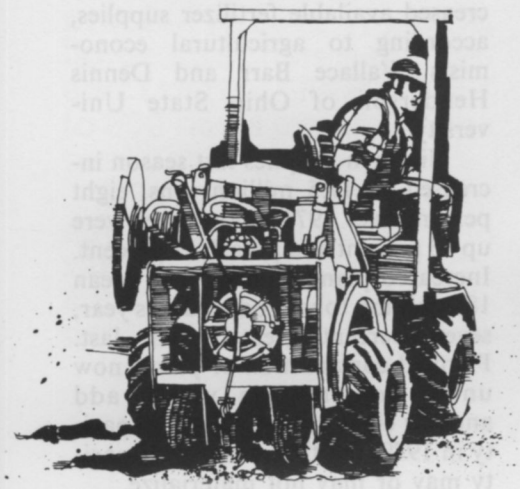

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Study of Tussock Moth Begun by Idaho Scientists

Scientists at the University of Idaho, Moscow, are studying the biology and control of the Douglas-fir tussock moth in Northwest forests, hoping to uncover better ways to handle future outbreaks of the forest pest.

Howard W. Smith and Arthur R. Gittins, of the university department of entomology are studying the parasites and predators of the dusky-maroon moth which stirred much controversy between environmentalists and foresters during a major outbreak in 1973 and 1974. The pair, assisted by research associate Russell W. Clausen and graduate assistant Kurt C. Volker, are looking at the effects of chemical and biological control agents on insects in the forest environment, principally the parasites and predators of the tussock moth. They are also studying the ecology of these natural control agents.

Native to the Northwest, the Douglas-fir tussock moth remains at relatively low population levels most of the time. It causes no appreciable damage at these endemic levels, and probably goes undetected to anyone but the trained observer. However, every six to 10 years, the pest population explodes into epidemic proportions. Tussock moth caterpillars kill thousands of trees and stunt the growth of thousands more because of varying degrees of defoliation or needle loss. The quality of future lumber supplies is frequently reduced because of the insect's damage to a tree's main shoot or leader.

Very dry weather, coupled with large tussock moth populations, increases the chances of forest stand losses. These circumstances coincided in 1973 and 1974 to produce a major outbreak in the Northwest. The economic impact of tussock moth damage differs from one kind of forest owner to the next. "Government and large timber companies can usually absorb the losses; small landowners usually cannot," Smith told WEEDS TREES & TURF. The thrust of the recent — and still controversial — spraying program which used DDT was toward assisting the small landowner who could hardly afford to lose even a single acre to moth attack.

Fertilizer Supply Increases

Higher fertilizer prices apparently have encouraged more plant capacity and surpluses overseas have increased available fertilizer supplies, according to agricultural economists Wallace Barr and Dennis Henderson of Ohio State University.

Nitrogen supplies last season increased to 17.5 million tons, eight percent over 1974, phosphates were up 13 percent and potash 11 percent. Increased plant capacity may mean 18.8 million tons produced this year, seven percent greater than last. Planned construction or plants now under construction would add another eight million tons of capacity in 1979, but this increased capacity may or may not materialize.

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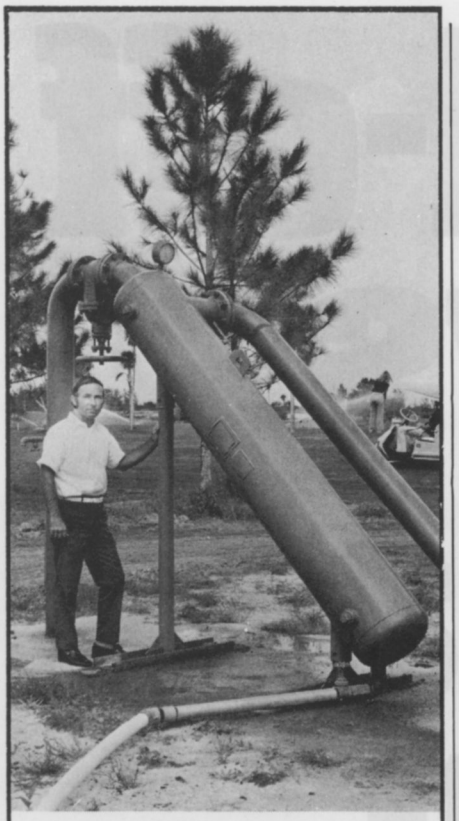

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NEWS *continued*

Landscape, Garden Clinic February 22 in Louisville

The National Landscape Association and Garden Centers of America will again sponsor a joint management clinic February 22-25 at The Galt House, Louisville, Kentucky. This is the second year these two organizations have cooperated in such a meeting.

The Landscape/Garden Center Management Clinic is designed so sessions dealing with only landscape operations will be held on different days from those dealing solely with garden center operations. For further information, contact the Landscape/Garden Center Management Clinic, 230 Southern Building, Washington, D.C. 20005.

Fescue for Shade Tolerance Turf Research Expert Says

Although Glade may have more shade tolerance than other bluegrasses, for real shade tolerance, stick with the fescues, according to C. Richard Skogley, professor at the University of Rhode Island.

His comments were reported in a recent issue of the newsletter of the Maine Golf Course Superintendents Association by editor Vaughn Holyoke of the University of Maine. Speaking at a meeting of the association, Dr. Skogley also said Brunswick is one of the new bluegrasses that warrants a close look by turf people. Dr. Skogley pointed out that this variety topped the bluegrass list when managed at a ¾-inch cutting height.

Hesston and Versatile Terminate Merger Pact

Hesston Corp., Hesston, Kan. and Versatile Manufacturing Ltd., Winnipeg, Canada said discussions concerning Hesston's proposed acquisition of a controlling interest in Versatile were suspended and an agreement between the two terminated. Hesston's Lawn Equipment Division is located in Indianapolis, Ind.

The two equipment makers indicated interest in resuming the discussions later but said "the current financial climate in Canada and the United States was not conducive to the completion of the merger at this time."

Peter Pakosh, chairman, and Roy E. Robinson, president, the controlling holders of Versatile, had signed an agreement in September to sell a controlling interest to Hesston, Hesston said. At the time, Versatile announced the transaction involved 1.2 million, or slightly more than half, of the concern's voting shares in exchange for about $20 a share in cash and Hesston stock.

The Demand for Fertilizer Will Outrun Spring Supply

Coming off a disappointing 1975, the nation's fertilizer producers are happy about their prospects for spring. But that is not necessarily good news for the green industry.

Fertilizer inventories, a drag for most of last year, are being liquidated rapidly now. By April nitrogen fertilizers could be in extremely tight supply. Potash fertilizer supplies are already rather uncertain, says Jesse L. Way, general sales manager of Kaiser Aluminum & Chemical Corp.'s Agricultural Chemicals Div. But R. R. Mehrhof, of Columbia Nitrogen Corp., says ammonia production for nitrogen fertilizers should be adequate.

Experts say there is no question demand for fertilizer will outrun supplies this spring. Ammonia products will be in especially tight supply and their prices may temporarily jump as much as 10 percent. But by summer, a reversal is expected to take place. Prices will start leveling off because a flood of new ammonia capacity is becoming to come on stream. Williams Co., parent company of Agrico Chemical Co., for example, has completed a $350-million fertilizer expansion program.

They say next year and in 1978 the supply of nitrogen fertilizers will be heavy because of large new plants beginning. But unlike the situation in the late 1960, there will neither be a glut nor will prices fall much, it was reported in *Business Week*. The reason is that the economics of the fertilizer business has changed in the past 10 years, and raw materials are no longer cheap and plentiful.

Chemical Sales To Up 25% Prices Could Jump 15%

For U.S. chemical companies, 1976 is starting off very well. Sales of organic chemicals could be up as much as 25 or 30 percent for the first half of the year, and inorganic chemical sales could be up 10 to 15 percent. Prices of all types of chemicals for all industries will be increasing this year, too, it was reported in *Business Week*. In organic chemicals, price increases could average as high as 15 percent; in inorganics, prices could go up an average of 10 percent.

Demand will help producers make such increases stick. The chief reason, however, for the chemical price increases expected will be increasing energy and raw materials costs, according to industry experts. The price of everything from natural gas to oil and sulfur is soaring. And power rates are also up at least 10 percent.

New Franchise Distributor Announced by Rain Bird

Rain Bird, Glenmore, Calif. has appointed Century/Rain-Aid Supply Corp. as the new franchised turf distributor to serve the greater Chicago area market, northern Illinois and northwest Indiana. Century/Rain-Aid Supply is a new division of Century Supply Corp. of Berkley, Mich.

According to Ernie Hodas, president of Century, the new division will stock and distribute the largest supply of Rain Bird sprinkler equipment and turf irrigation equipment in the Midwest. Century/Rain-Aid will also maintain a system design capability to assist in the installation of irrigation systems at golf courses, residences and commercial sites. The company is at 341 Lively Blvd., Elk Grove Village, Ill. 60007.

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Record 1975 Sales Results For Diamond Shamrock

Diamond Shamrock Corp., Cleveland, said it had record sales and earnings for both the fourth quarter and 1975 and that it sees "considerably better" results this year.

The company said fourth quarter net income rose 20 percent to $32.2 million, or $1.89 a share, from year-earlier $26.7 million, or $1.65 a share. Sales gained 8.5 percent to $285.8 million, from $263.4 million.

Chairman C. A. Cash said it was too early to estimate 1976 earnings. But he said, "with the new chemical and plastics capacity already in place and anticipated increases in oil and gas production, we are well-positioned to continue earnings growth in 1976."

Herbicide Market Expansion Averaged 16% Last 5 Years

In the past five years, the herbicide market has expanded an average 16 percent a year in the United States and 26 percent abroad, according to a recent report in the *Wall Street Journal*.

Many analysts of the market say the herbicide market looks like the next possible market that might swing from shortage to oversupply, increasing price competition and substantial erosion of profit margins for the companies. "In our opinion, the days of rapid growth and high margins are coming to an end," says Jay J. Meltzer of Loeb, Rhoades & Co. in a recent review entitled, "Herbicide Suicide."

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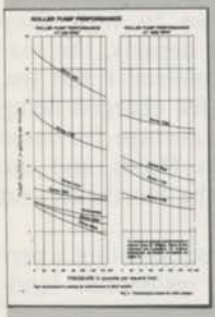

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Landscape Fees the Subject Of an Industry-Wide Survey

While a large number of landscape companies charge a flat fee for commercial landscape design services, charging by the hour is more common, with the rate averaging $17.80 an hour, according to a recent survey conducted by the National Landscape Association.

A total of 79 percent of the respondents indicated their firms offer residential landscape design services. The percentages reported by regions were relatively uniform, with the southern region having the lowest percentage offering such services. In response to how they charged for these designs, the majority of firms preferred a flat fee, with the average fee charged being $108. The lowest average fee came from the Western Plains and the highest fee from the Northeast and Pacific regions.

For those firms indicating a per-hour charge for residential landscape design plans, the average was $15.45 an hour. New England led with an average rate of $16.60 and the Great Lakes was lowest with $13.80. Of the firms responding, 70 percent indicated they offer partial or total refund of the design costs when they get the planting contract. The survey showed that this practice is more prevalent in the Great Lakes and Western Plains than in other regions.

Commercial landscape design services were provided by 66 percent of the firms. It was found members in the Northeast, Southwest and Pacific areas specialize to a greater degree in commercial plans than firms in other regions. While a number of firms charge a flat fee, as was mentioned, charging by the hour is more common. The average rate of $17.80 for this ranged from $14.40 in the Great Lakes to $22.75 in the Northeast. Just over one-half refund a part or all of the design costs when the planting contract is signed.

In response to the questions regarding landscape estimate services, only 22 percent said they provide such a service. This is done on both a flat-fee and per-hour basis, but the per-hour charge appeared to be more common. Average hourly rate indicated was $17.40, with a range from $12 an hour in the Great Lakes area to $22.50 in the Northeast. Regarding refunds, 60 percent of the respondents reported they credit part of all of the estimating job if they get the planting contract.

Insurance estimate service was provided by 84 percent of the firms. This practice seems universal with very little difference in the range. The Pacific area had the lowest percentage with 78 percent, and the Western Plains had the highest with 89 percent. About three times as many of the firms charge a flat fee for insurance estimates as charge on a per-hour basis. The average flat fee was $20.60 and the average per-hour rate was $18.80.

Consulting service was offered by 74 percent of the responding landscape firms, with very little difference from region to region. The method of charging for these services was just opposite that for insurance estimates, the survey reported. About three times as many firms charge a per-hour rate as charge a flat fee. The average per-hour rate was $19.40 and the average flat fee was $32.65. There was greater uniformity from region to region in the hourly rate than in the flat fee. The Southwest had the lowest average per hour consulting fee at $18. The Western Plains had the highest at $22.

The regions are: Northeast — New England states, New York, New Jersey, Pennsylvania and the Canadian provinces to the north of these states; Southern — Atlantic and Gulf Coast states from Delaware to Alabama and Kentucky, Tennessee and West Virginia; Great Lakes — Illinois, Indiana, Michigan, Ohio, Wisconsin and Ontario; Western Plains — states north of Missouri, Kansas and Colorado and Alberta, Saskatchewan and Manitoba; Southwestern — Arkansas, Louisiana, New Mexico, Oklahoma and Texas; Pacific — Arizona, Utah, Idaho and those states to the west including Hawaii, Alaska and British Columbia.

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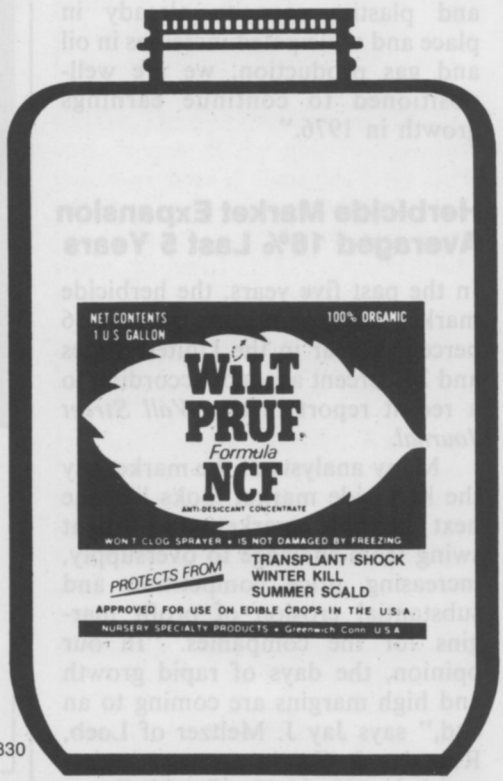

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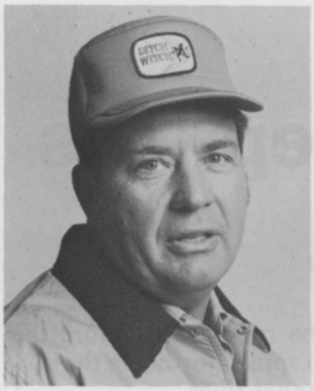

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DITCH WITCH

Magic, myths and misconceptions

By WALTER E. MONEY, Guardian Tree Experts, Inc., Rockville, MD

. . . was the topic of the 1975 Fall Seminar of the Maryland Arborist Association. Approximately 20 arborists traveled to the Hubbard Brook Experimental Forest of the U.S. Forest Service in the White Mountains of New Hampshire to be with Dr. Alex L. Shigo and see first hand "CODIT:" Compartmentalization of decay in trees.

The group gathered on a Wednesday evening at a nearby resort motel and got an early start on Thursday with a sneak preview of a new Forest Service slide program that Shigo has put together on CODIT. (We understand this program and cassette narrative will be available in a few months.)

Most of Thursday and half a day on Friday was spent walking through the woods with Shigo and his trusty powersaw. Al would explain to the arborists that outward signs indicate the internal condition of the tree, the cambium could be "metered" for vigor, and the heart of the tree probed with the Shigometer. Finally, he would fell the tree and dissect it with his Homelite "scalpel" and conclusively prove his points.

It was obvious that the more vigorous a tree was, the quicker it would wall off an attack by decay after wounding. Particularly, at the top and the bottom of the wound to keep the decay out of the crown and the roots. Also, the year after wounding the cambium develops a new type of tissue called the "barrier zone" to seal off the decay on the inside and allow the tree, with the succeeding annual rings, to develop clear healthy wood.

Some of the magic myths that Shigo's work has exploded are:

1. Tree paint: Only cosmetic; it appears to be of no help in preventing decay and insect attack. However, wound "treatments" that look promising are now under study.

2. Once a fungus gets into a tree wound, it moves throughout the tree: Fungus only moves in the wounded compartment. The tree needs to be rewounded before the fungus will spread further in the succeeding annual rings.

3. Heartwood fungus moves at will: Same rules apply.

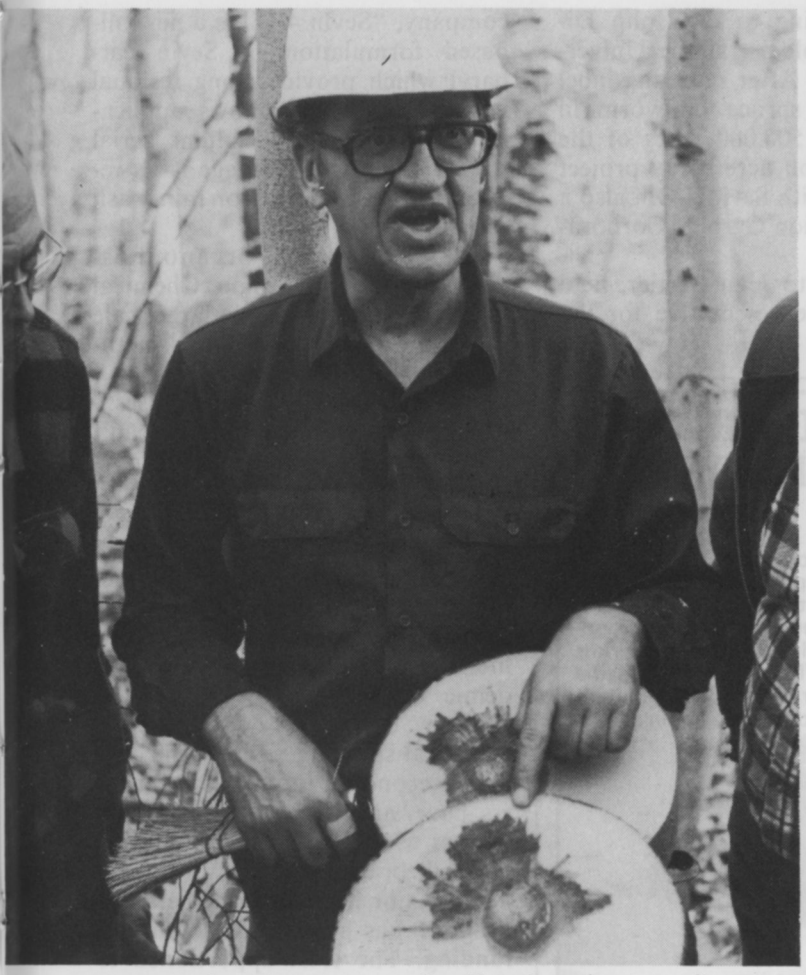
4. Frost cracks caused by frost: Caused primarily by old basal wounds that have healed improperly and exert pressure from inside.

5. Thoroughly clean out old cavities before filling: Actually, thorough cleaning prior to filling a cavity breaks the compartment wall on the inside where it is most vulnerable and allows decay to spread.

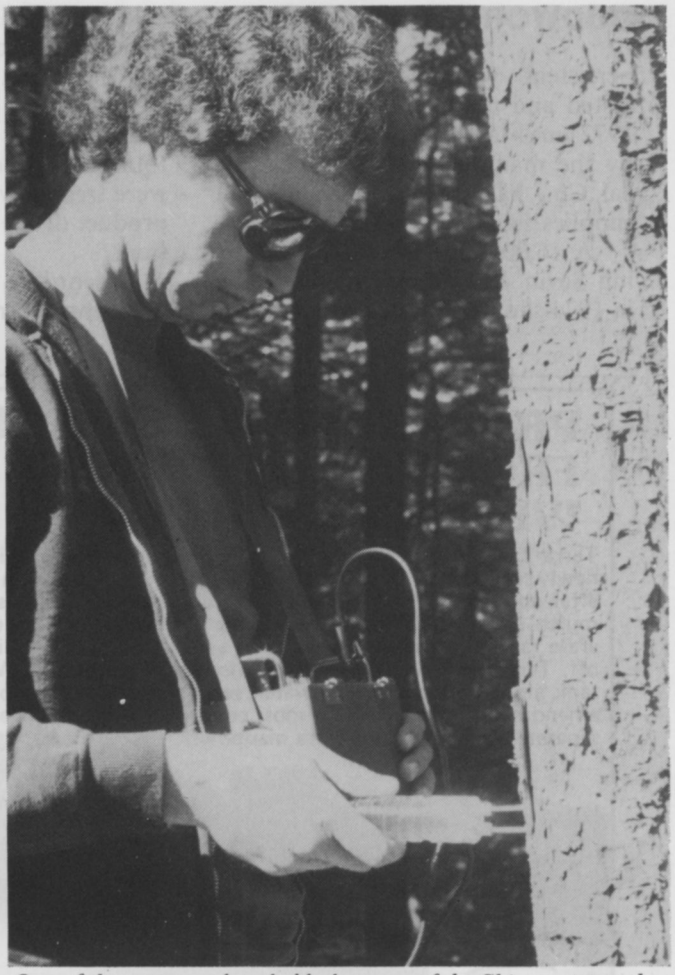
These and many other myths have been perpetrated over the years due to theoretical "scholarly" analysis that was not based on factual studies. Shigo's work has revolutionized the tree-care industry and has also provided, in the Shigometer, the "X-Ray" machine arborists have needed for so long to read the vigor and itnernal condition of the trees under care. □

Circle 150 on free information card

A brief explanation of "CODIT" (compartmentalization of decay in trees) in the classroom before venturing into the research area.



Remember that a tree walls-off and compartmentalizes its wounds. The following year the cambium puts up a barrier zone so that succeeding rings of new wood are clear and healthy.



One of the newer and probably best use of the Shigometer to the professional arborist is the way in which the cambium can be quickly metered and checked for vigor as Al Butler demonstrates.

Any tree the arborists picked was fair game to be dissected and analyzed.

Cutting sections and then lining them up was the easiest way to demonstrate decay.

BUDWORM *(from page 20)*

persistent weapons. Zectran was tested and used operationally from 1972 until last year, but production by the manufacturer, Dow Chemical Co., has been stopped and all supplies have now been exhausted.

A 16,000 acre pilot project testing Sevin 4-Oil carbaryl insecticide in 1974 showed "quite promising results," according to Dr. John Dimond, entomologist at the University of Maine. After receiving label clearance for spruce budworm in March, 1975, 500,000 acres of the total 2.2 million acre spray project were treated with Sevin 4-Oil, also a product of Union Carbide Corporation.

According to Jean Cartier, field development representative for the company, "Sevin 4-Oil is a new oil-based formulation of Sevin carbaryl which provides long residual insect control and allows application as an ultra low volume aerial spray. A major advantage is its resistance to weathering or rain wash off on plant surfaces.

Sumithion, an organophosphate of the Sumitomo Chemical Co. of Japan, was also in large scale use and other chemicals and methods of control were tested.

"We've tried parasite releases," Chadwick states, "but they can't keep up with the epidemic proportions of the budworm population." Bacillus thuringiensis, a bacterial control agent is also being tested. Natural or biological control factors, though they may be attractive to the project's critics, appear to be ineffective against the massive epidemic proportions of the present spruce budworm infestation. Chemical spraying remains the only viable economic option the foresters have, and it has achieved good success with results generally in the 90% kill bracket.

A major hindrance in the spray program has been the instability of funding. The total apportioned to the project this year was eight million dollars, half of which was to come from the federal government, and the other half from the state, and private lumber companies. But in recent years, notably last year, funding has come through only at the last minute imposing problems for the project directors regarding procurement of the required amount of insecticides, aircraft and logistics.

The project itself is reminiscent of the Presque Isle airport's heyday as the debarkation point for World War II bombers. Many of the project staff moved into the airport barracks weeks before the spraying started to set up the necessary mixing, pumping, communications and transportation equipment. Many of the people involved have had experience with other large scale programs of this sort.

Forty-six pilots flying insecticide on the forest in the 1975 operation came from as far away as Oregon, Arizona and Georgia, and

(continued on page 50)

PROTECT NEWLY SEEDED AREAS FROM WIND AND WATER EROSION WITH TERRA TACK

Terra Tack used in any hydrograsser or hydroseeder provides erosion control for newly seeded areas or any other soil surface needing erosion protection. Terra Tack after application forms a water insoluble gelantinous crust, locking the seed and mulch to the soil. This invisible crust is, however, porous enough to permit moderate rainfall or irrigation water to soak into the soil, while excessive water runs off. Terra Tack also reduces soil moisture evaporation. When added in the same tank along with a slurry of water, seed, mulch, fertilizer or other compatible soil amendments, Terra Tack, in most cases, eliminates the need for two applications, separate equipment and extra manpower.

Versatile Terra Tack can be used with straw, hay or wood fiber mulch.

Straw or Hay Mulch

Terra Tack when applied as a direct spray to straw or hay mulch helps prevent wind and/or water displacement of the mulch and seed.

Wood Fiber Mulch

Terra Tack when combined with fiber mulch, seed and water acts as a complete binder helping to lock the protective mulch blanket to the soil.

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Crowns, 100 to 1000, 14¢ each; 1100 to 5000, 12¢ each; 5100 to 10,000, 8¢ each; 10,000 or more, 7½¢ each.

Crownvetch plants in peat cubes or peat pots, 100, 22¢ each; 600, 20¢ each; 1100, 19¢ each; 2600, 18¢ each; 5100, 17¢ each.

These prices include packaging and free delivery within a 500-mile radius. Beyond 500 miles, add 1 cent each on plants only.

For information on seed to meet state specifications and attractive brochure, write or call:

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Backflow Preventers

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Order from your irrigation supplier.

For more information contact: TORO Technology, Dept. WT, 1709 La Costa Meadows Dr., San Marcos, CA 92069. (714) 744-5650.

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Meeting Dates

Golf Course Superintendent's Association of America, 47th international conference and show, Auditorium and Convention Hall, Minneapolis, Minn. Feb. 8-13.

Midwestern Chapter, International Society of Arboriculture, Sheraton-O'Hare Motor Hotel, Rosemont-Chicago, Ill., Feb. 10-12.

Illinois Landscape Contractors Assoc., annual seminar, Villa Olivia Country Club, Feb. 12-13.

American Society of Consulting Arborists, 10th annual meeting, Vacation Village, San Diego, California, Feb. 12-14.

Canada Chapter, International Society of Arboriculture, Chateau Frontenac Hotel, Quebec City, Quebec, Feb. 12-14.

National Arborist Assoc., annual meeting, Vacation Village, Mission Bay, San Diego, Calif., Feb. 15-19.

Wisconsin Arborist Association, annual convention, Midway Motor Lodge, LaCrosse, Wisconsin, Feb. 18-19.

International Pesticide Applicators Association, Successful Business Management Practices, Botanical Gardens, Denver, Colorado, Feb. 20-21.

Southern Chapter, International Society of Arboriculture, Myrtle Beach Hilton, Myrtle Beach, S. Carolina, Feb. 22-25.

Shade Tree Short Course, 19th annual,Scheman Continuing Education Center, Iowa State University, Ames, Iowa. Feb. 25-27.

International Erosion Control Conference, 7th annual, Downtown Sheraton Motor Inn, Portland, Oregon, Feb. 26-27

Midwest Turf Conference, Purdue University, W. Lafayette, Indiana, Mar. 1-3.

Professional Turf and Plant Conference, eighth annual, Saisbury Club, Eisenhower Park, East Meadow, L.I., N.Y., Mar. 2.

Professional Turf and Landscape Conference, sixth annual, Ramada Inn, North Haven, Conn., Mar. 3.

Southern Turfgras Conference and Show, Cook Convention Center, Memphis, Tenn., Mar. 7-9.

Canadian Golf Superintendents Association, 27th Annual turfgrass show, Inn-on-the-Park, Toronto, Ontario, Mar. 8-10.

Northeastern Forest Pest Council, winter meeting, Copley Plaza Hotel, Boston, Mass., Mar. 10-11.

THE UNDERCOVER WEED KILLER.

Weeds and roots under asphalt paving can cause tremendous damage. But you won't know they're doing it until it's already done. That's why you need **CASORON**, the Undercover Weed Killer.

CASORON is approved for use under asphalt, whether it's a recreational court, a golf path, or a parking lot. Applied over the subgrade, **CASORON** soon begins to emit a weed-killing vapor. This gas is trapped under the asphalt, forming a long-lasting protective blanket against weed breakthrough. Straying roots from ornamental plants bordering asphalt surfaces can't damage the surface because **CASORON** is a "root-inhibitor." The tips of the ornamental roots stop growing when they come in contact with the **CASORON**-treated soil, and no harm is done to the ornamental.

CASORON is also perfect for weed control around all kinds of ornamentals and trees. Use it in parks, beside buildings, along highways, in cemeteries, or almost anywhere to eliminate the need for costly, time-consuming close trimming and mixing. It effectively kills more than 65 perennial and annual weeds without harming ornamentals or sterilizing an area for future planting.

T-H
THOMPSON-HAYWARD CHEMICAL COMPANY
A NORTH AMERICAN PHILIPS COMPANY
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"STOP! All pesticides can be harmful to health and the environment if misused. Read the label carefully and use only as directed."

5-6860R

Planes are loaded with insecticide at this Presque Isle pumping station.

BUDWORM *(from page 46)*

brought with them thousands of hours of flying time ranging from crop dusting, fire bombing and range spraying to stunt work in movies.

The forty-five planes used ranged from small chase or spotter planes which were used to guide the spray planes, to Generals MacArthur and Eisenhower's Constellations. TBM's, PV-2's and C-4's, familiar planes to many, were also in abundance. Also used were several helicopters for application on the difficult areas around towns and isolated forest land. Spraying was done in the early morning and early evening hours when wind caused drift would be minimized. The planes flew only 150 feet over the forest canopy spraying insecticide with the most accuracy possible.

Spraying was confined to only the most seriously affected forest land while avoiding lakes, fish ponds and farms. The pilot's accuracy, combined with the swift biodegradation of the insecticides used and detailed mapping out of the target forests had reduced the possibility of harmful environmental impact. State health officials however, were also in attendance doing follow-up research on the wildlife and watersheds in the area.

The outlook for the future however, is grim. Although control efforts have been highly successful, they do not approach the extent of the total budworm infestation. The spray projects are expected to continue for a number of years, but officials are hoping for a beneficial shift in weather patterns or insect population developments which will provide deterrent on the epidemic. □

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Forest fires burn more than trees

Reduced Quarter Earnings Announced by Northrup

Northrup, King & Co., Minneapolis, said inventory write-downs reduced fourth fiscal quarter earnings about $1.3 million, or 13 cents a share.

For fiscal 1974's fourth quarter, the company reported net income of $1.6 million, or 16 cents a share. In fiscal 1975's first nine months, net income was $8 million, equal to 80 cents a share. Major inventory adjustments occurred in wheat, Bermudagrass, ryegrasses and alfalfa, the company said.

Outboard Marine Corp. Announces 1975 Earnings

Outboard Marine Corp., Waukegan, Ill., parent company of Cushman-Ryan turf care equipment, has reported preliminary net earnings of $20 million in fiscal 1975, a 20 percent increase from net earnings of $16.7 million in fiscal 1974.

The preliminary net earnings, which are subject to final audit, are expected to be $2.42 per share in fiscal 1975 compared to $2.02 per share a year earlier.

Hawaii Turf Distributor Moves Into New Facilities

B. Hayman Co., Inc., Honululu a 100-year-old professional turf maintenance equipment and golf car distributor, has moved into new, 22,000-square-foot industrial space at 94-062 Leikane St., Waiphu.

Beard, Nutter and Coats Head Southern Turf Show

Dr. James B. Beard, Texas A & M University, Dr. G. Euel Coats, Mississippi State University, and Dr. Gene C. Nutter, Lake City Junior College, Lake City, Fla. are headline speakers for the annual Southern Turfgrass Conference and Equipment Show, March 7-9 in Memphis, Tenn.

Association president Gene Baston of the Country Club of Birmingham, Alabama said the equipment show will bring the leading suppliers of turf equipment for this regional show that is one of the biggest turf shows in the country.

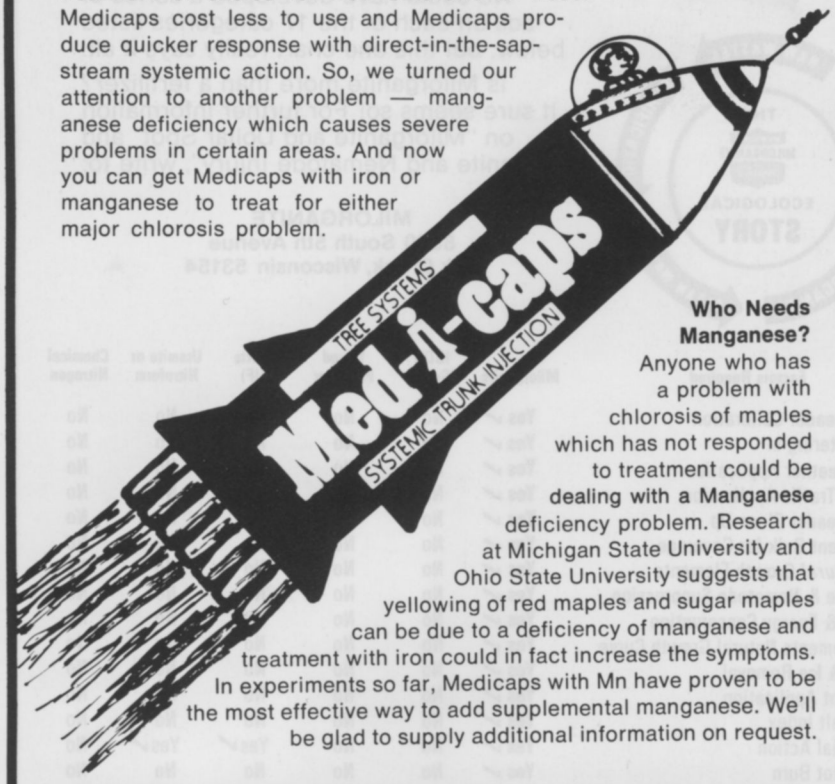
Other speakers include: E. Edward Bates, product manager, F. E. Meyers and Brothers Co., Ashland, Ohio; W. C. Bowle, superintendent at Memphis Municipal Golf Courses; Jim Bridges, superintendent at Creeks Bend Golf Course, Hixson, Tenn.; Roy Clark, chief of the pesticide branch of the Environmental Protection Agency offices in Atlanta; Bill Hoopes, manager of the Professional Turf Institute, O. M. Scott & Sons, Marysville, Ohio; Palmer Maples, Jr., superintendent at the Standard Club, Atlanta, and president of the Golf Course Superintendents Association of America; and Shull Vance, superintendent at Country Club of Mobile, Alabama.

We've added a Second Stage to our

MEDICAP Rocket

Now the best control for Manganese Chlorosis is available with MEDICAP MN

The people who know recognize Medicaps as the treatment of choice for Iron Chlorosis of trees. Medicaps cost less to use and Medicaps produce quicker response with direct-in-the-sapstream systemic action. So, we turned our attention to another problem — manganese deficiency which causes severe problems in certain areas. And now you can get Medicaps with iron or manganese to treat for either major chlorosis problem.



Who Needs Manganese?
Anyone who has a problem with chlorosis of maples which has not responded to treatment could be dealing with a Manganese deficiency problem. Research at Michigan State University and Ohio State University suggests that yellowing of red maples and sugar maples can be due to a deficiency of manganese and treatment with iron could in fact increase the symptoms. In experiments so far, Medicaps with Mn have proven to be the most effective way to add supplemental manganese. We'll be glad to supply additional information on request.

TREE SYSTEMS ® Med-i-caps SYSTEMIC TRUNK INJECTION

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Oregon Grass Seed Growers Threatened by State Law

Oregon's 1,800 Willamette Valley grass seed growers are fighting to keep the $65-million grass seed industry from being flushed out of the valley in one huge environmental sweep. State law, passed in 1971, gave the grass seed industry until last year to come up with a smoke-free way of sanitizing their grass seed fields.

The cultural practice of grass seed field burning has been carried out since the mid-1940s when it was determined that after-harvest burning of straw in fields killed insects and disease spores and rid fields of weed seeds. The 100-mile long, 50-mile wide valley has some 270,000 acres of grass seed fields producing virtually all of the ryegrass grown in the United States and a high percentage of the bluegrasses, fine fescues, bentgrass, orchardgrass and smaller amounts of other turf and forage grasses.

Without burning, yields would drop as much as 50 percent in one year and serious problems of straw disposal and weed abatement would arise, say the growers. Costs in changing to new methods of burning would include purchase of a not-yet-perfected field sanitizing machine costing upward of $10,000, plus propane, gasoline for pulling machinery and straw-gathering costs.

Factors to consider when selecting a fertilizer

We could have developed a series of ads on each of the 17 categories listed below, but this one chart really says it all.

Is Milorganite more than a fertilizer? It sure seems so! For further information on "Milorganite and Dollar Spot" and "Milorganite and Nematode Injury", write to:

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8500 South 5th Avenue
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Factors Required	Milorganite	IBDU (Swift)	Mixed Fertilizer	Scotts (UF)	Uramite or Nitroform	Chemical Nitrogen
No Spreader Calibration	Yes ✓	No	No	No	No	No
No Watering-In	Yes ✓	No	No	No	No	No
Bad Weather Application	Yes ✓	No	No	No	No	No
Heavy Traffic Application	Yes ✓	No	No	No	No	No
No Spreader Clean Up	Yes ✓	No	No	No	No	No
Sufficient Bulk for Coverage	Yes ✓	No	No	No	No	No
All-Natural Growth Elements	Yes ✓	No	No	No	No	No
Disease & Nematode Suppression	Yes ✓	No	No	No	No	No
Water & Energy Conservation	Yes ✓	No	No	No	No	No
Complements Natural Growth Curve	Yes ✓	No	No	No	No	No
Snow & Ice Removal	Yes ✓	No	No	No	No	No
Dormant Application	Yes ✓	No	No	No	No	No
Low Salt Index	Yes ✓	No	No	No	No	No
Bacterial Action	Yes ✓	No	No	Yes ✓	Yes ✓	No
Does Not Burn	Yes ✓	No	No	No	No	No
Long Lasting	Yes ✓	Yes ✓	No	Yes ✓	Yes ✓	No
Less Nitrogen Needed	Yes ✓	No	No	No	No	Yes ✓

MILORGANITE...

the number One Naturally Organic Fertilizer

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Roots of Water Hyacinth May Be Harvested for Gold

A geologist for a gold mining firm says his company may harvest the precious metal from the roots of the common water hyacinth. Manuel Bettencourt-Dias, a geologist for Gold Hill Mesa Corp., Colorado Springs, Colo., said his firm is interested in experiments now being carried on by researchers for the National Aeronautics and Space Administration (NASA).

Researchers for NASA are carrying out field experiments to determine the capability of hyacinths to absorb such metals as lead, mercury, silver and gold from water. "Though highly experimental, the program has produced some interesting results thus far," Bettencourt-Dias told WEEDS TREES & TURF. He said NASA estimates under a program of regular harvesting, an acre of hyacinths can yield silver at a rate of a pound every four days. Results of tests with gold are expected to be similar.

The primary intent of the NASA research is to develop an inexpensive and efficient process of removing toxic pollutants from the nation's rivers and streams, but Bettencourt-Dias said he sees possible commercial use. He said his firm might be able to recover gold from the old famous Cripple Creek mining tailings using such a process.

"Presently, the accepted and proven method of gold recovery — vat-leaching — can economically remove only about 60 percent of the gold," he said. "Hyacinths, as a secondary method, might be able to recover some of the remaining 40 percent."

We finally found a way to improve Balan...

Granules shown actual size

...we made it easier to apply!

Balan's new granular size lets you apply it like fertilizer, and makes it easier than ever to effectively control some of your tough weed grasses.

Balan gets the tough ones,

such as, crabgrass, foxtail, goosegrass and Poa annua.

After ten years of proven success on thousands of acres of turf, Balan has become the nation's number-one granular preemergence herbicide. Its unmatched effectiveness and economy make Balan a "must" in every turf program.

Goosegrass
(crowsfoot, silver crabgrass and hard crabgrass)*

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(annual bluegrass)

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South—S. C. Dolinak
3035 Directors Row, Suite 408, Memphis, TN 38131

Northeast—A. G. Ekeson
5 Campbell Road, Fairfield, NJ 07006

Southeast—M. E. Nealon
2776 Jo Beth Drive, Lawrenceville, GA 30245

Midwest—S. H. Springer
P. O. Box 50279, Indianapolis, IN 46250

Midwest — R. G. Baade
R.R. 6, Box 332A, Martinsville, IN 46151

Or write Dept. E 455

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U.S. Plant Patent 3151

Another fine, quality-controlled product of Jacklin Seed Company.

Glade is a healthy little bluegrass with a higher level of resistance to powdery mildew and a better ability to grow under trees in up to 60% shade. Grows beautifully in open sun, too! Glade Kentucky bluegrass is your guarantee of physically pure and genetically true seed. You won't be plagued with annual bluegrass *(Poa annua)*, bentgrass or short-awned foxtail when you plant Glade.

A selection from Rutgers University, Glade has improved resistance to stripe smut, leaf rust, and good resistance to leafspot. Nationally tested as P-29, Glade is one of the fastest germinating bluegrasses. It establishes quickly forming a dense sod and thick, low-growing, leafy turf of a beautiful, medium to dark green. Glade mixes well with fine fescues for higher acid soils and blends well with other elite bluegrasses, persisting in moderate shade when others weaken.

Specify Glade Kentucky bluegrass for use in full sun or in mixtures with fine fescues for shade. You'll find Glade at your local wholesale seed distributor.

Good supplies of new crop Glade seed available early August.

when it comes to solving tough Turf problems C.B. Dolge has...

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He's Dr. Paul M. Alexander, renowned agronomist and one of the world's leading experts on the growth and care of turf. As head of a newly organized C.B. Dolge team of experts, he's prepared to help you solve those stubborn turf problems that can adversely affect your business.

You can contact Dr. Alexander through any of the 40 C.B. Dolge representatives east of the Mississippi, under the direction of Turf Manager, Sal Vento, or through the company's southern subsidiary, GOLTRA, Inc., whose 8 representatives are directed by Charles Dolge.

Whatever your turf problem, our "Answer Man," Dr. Alexander and his C.B. Dolge team of experts have the answers – and a complete line of Golf and Grounds Maintenance products – to solve them.

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we have the answers

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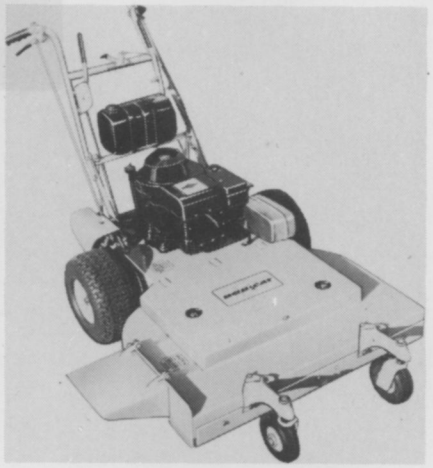
New Products

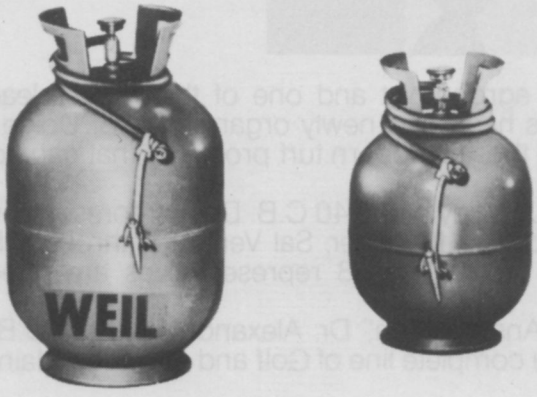
HEAVY DUTY: Reinco's new heavy duty mulcher is said to spread a quarter of a million pounds of hay per day — more when straw is used. The manufacturer also says that uniform distribution of mulch can be obtained at distances up to 95 feet. The unit is trailer-mounted with high ground clearance for added maneuverability on rough terrain as well as yard site mobility. The straight-through drive enables the M-80 to handle soggy, moldy or poor quality material without lumping or clogging. An optional emulsion spray system is also available.

Circle 701 on free information card.

MOWER: Bob-cat's model 36-10 and 48-10 are new heavy-duty self-propelled, walk-behind mowers able to cut 36 in. or 48 in. swaths. A 10 HP engine provides ample power for tought cutting with speeds up to 4 mph, according to the manufacturer. With power steering and independent-wheel drive, the 36-10 provides zero-turning radius for easy handling and maneuvering. An easy grass dump will be available.

Circle 703 on free information card.



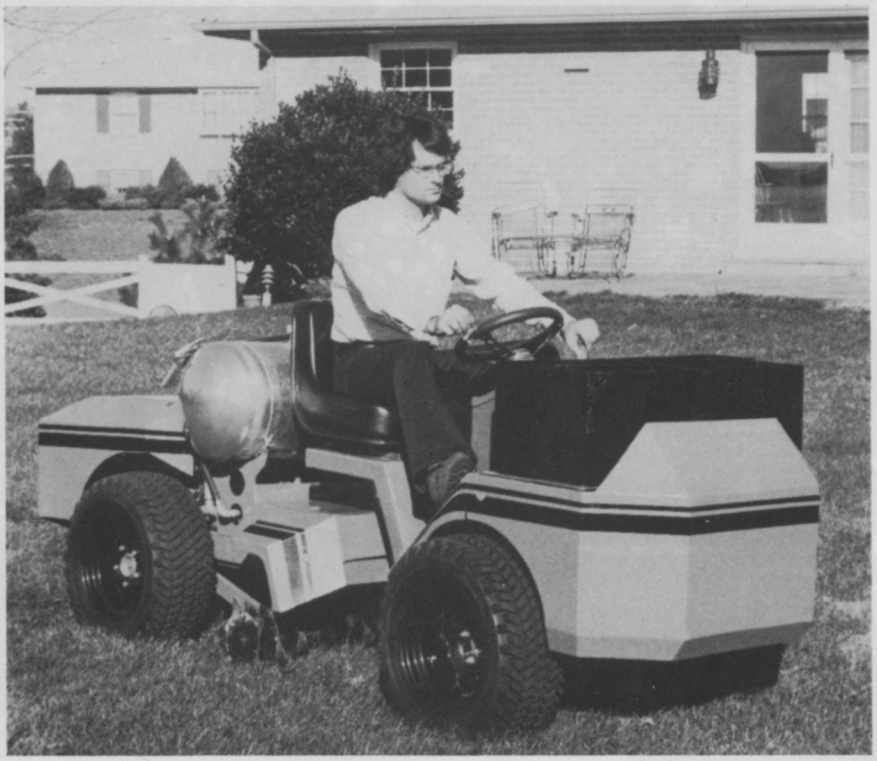


AIR CAN: Here's two portable air tanks from Weil Service Products that come fully equipped to handle a wide variety of jobs, including inflation of tires, blowing dust and dirt from inacessible locations, drying out wet ignition systems and parts, and blowing out clogged line and passageways in machinery. Tanks have a 250 lb. working pressure, enabling them to store a large volume of air very compactly, says the manufacturer. Both 3.5 and 7.5 gallon models are lightweight and guaranteed to be airtight.

Circle 702 on free information card.

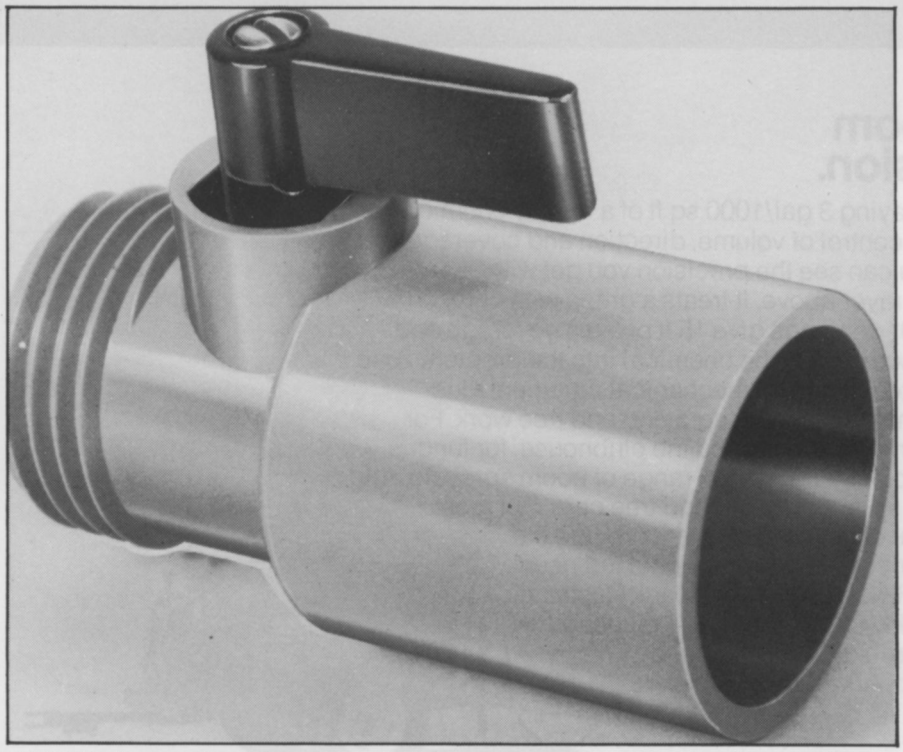
AERATOR: The Cyclo-Spiker attachment installs on most models of rotary broadcast spreaders and enables the user to perform the two functions simultaneously. The unit is available in spiking widths of 22 in. and 28 in. Penetration of 1¾ in. is achieved by knife-like hardened steel piercing discs with slight natural downward pressure on the handle, says Turf Maker, Inc.

Circle 704 on free information card.



UNI-TRAK: Here's a unit for the automated lawn industry that features a 20 gallon tank sprayer with a flood jet nozzle. Uni-Trak Equipment Co. also says that the machine's four hoppers can hold up to 60 lbs. of granular material or seed. The unit is powered by an 16 HP Onan gasoline engine.

Circle 710 on free information card.



VALVE: Specialty Mfg. Co., has introduced this fast acting ball-type value designed specifically for precise control of water flow in drip irrigation systems. The valve is made of durable PVC for resistance to chemcials and corrosion.

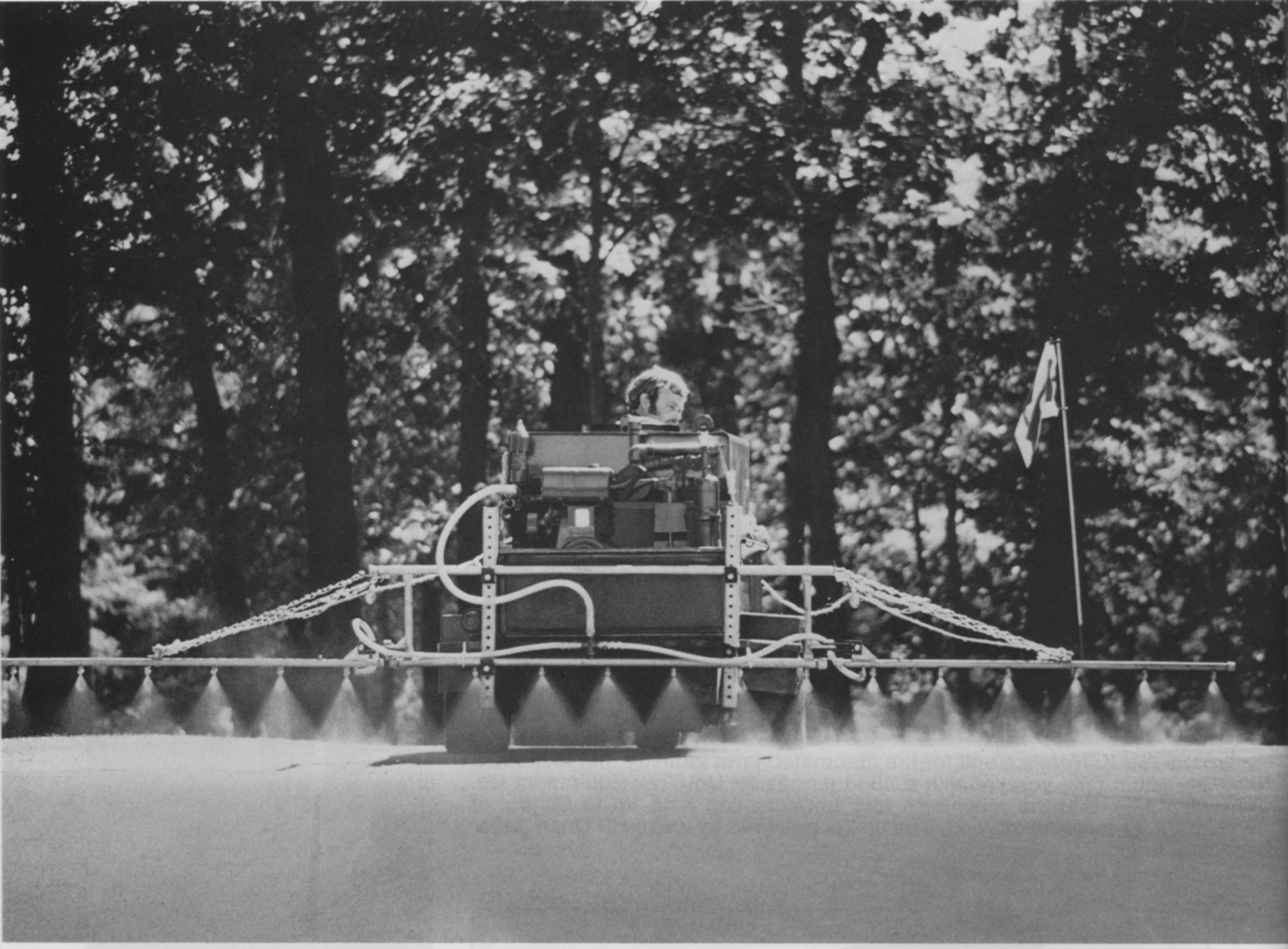
Circle 711 on free information card.

LIFT: This forklift attachment enables even medium-sized tractors to handle and lift loads of almost 3,500 lbs. without the use of sub-frames, according to Watveare Overseas, Ltd. The unit features two pneumatic load-bearing wheels at the bottom of its frame to allow transfer of the full lifting weight from the tractor's axle to the forklift attachment itself. This transference allows the lighter weight tractors to lift and carry heavier loads. The 700 lb. attachment can be attached to the three-point linkage of virtually any tractor.

Circle 712 on free information card.

NEMA-JET: Soil Fumigants Co. recently applied for the patent on a new tool that injects nematicides and other pesticides below the soil surface. The Nema-Jet is a three-foot wide boom-type tool that is pushed over the turf by hand. Pressure is provided by conventional power spray unit and connected by a flexable hose. Special jet nozzles are set in the boom at 6 inch intervals. As the machine is in operation, the jets force a stock solution into the turf or soil to a depth of 2 to 5 inches, depending on soil, pressure and conditions, says the manufacturer. The unit is constructed of stainless steel and brass.

Circle 713 on free information card.



You can't beat a boom for precision.

When you're spraying 3 gal/1000 sq ft of a touchy chemical mix, you need all the control of volume, direction and coverage you can get. And you can see the precision you get with our 1010 utility vehicle sprayer above. It treats a green with care. 19 nozzles on 10" spacings give 15 ft of even coverage and controlled pressure drives the chemical into the problem zone. With stainless steel tank and mechanical agitation. Plus optional hose and gun for spot spraying and tree work. For tees, greens, fairways and around the clubhouse, for fungus, weeds and insects, we have a full range of boom sprayers. And labor-saving air sprayers for turf and tree care. But most important, we have the machines that provide the spray power to meet every professional turf need. Call your local FMC Dealer or call Jack Custer at (501) 935-1970, FMC Corporation, Agricultural Machinery Division, 5601 E. Highland Drive, Jonesboro, Ark. 72401.

FMC Environmental Equipment

Circle 108 on free information card

"Time is money in my book, so I feed trees with Jobe's."

Jack Fannin
Superintendent
Congress Lake Club
Hartsville (Cleveland),
Ohio

"Jobe's Spikes are clean and easy to use. They're a great time saver, so they're a money saver, too. Even inexperienced help can feed trees fast with Jobe's. There are no bags to lift or ingredients to mix. No drilling.

"We used them on Crimson King maples and Snow Drift crabapples. The trees had shown inconsistent growth for the past five years, so we applied 5 spikes to each tree the first week in November. By spring, we could measure the difference.

"Another advantage of Jobe's Spikes is very little loss through leaching. There's little if any run off in heavy rains. The fertilizer stays on target. Best of all, with Spikes we can keep exact records of how much fertilizer each tree receives over a given period of time, eliminating 'by gosh and by golly' methods."

Jobe's Tree and Shrub Spikes are easy, economical and effective. One spike per inch of trunk diameter feeds a tree for a full year. All you do is drive the Spikes into the ground. Tests at Purdue University have proven Jobe's as effective as drilled fertilizer. Write for the complete report.

Save time and money. Order Jobe's Spikes through your jobber or order direct. $30 per case (105 spikes) prepaid. Minimum order, 5 cases. $25 per case for 15 or more cases.

Jobe's®
TREE & SHRUB SPIKES
THE EASY METHOD
FOR PROFESSIONAL TREE CARE

International Spike, Inc.,
462 East High Street
Lexington, Kentucky 40508

THE 44-INSECT INSECTICIDE.

For trees, ornamentals, and turf.
One solution versus 44 problems. Those are pretty good odds.

Especially since you can't always be sure which insects will threaten the valuable trees, turf and ornamentals you protect. And people enjoy.

This broad-spectrum control with SEVIN® carbaryl insecticide takes some of the chance out of your job.

STOP! ALL PESTICIDES CAN BE HARMFUL TO HEALTH AND THE ENVIRONMENT IF MISUSED. READ THE LABEL CAREFULLY AND USE ONLY AS DIRECTED.

Its versatility also lets you cut down on the need for a large chemical inventory. Why use an array of different brands with different instructions, if you can do the job effectively with a single product? You'll enjoy less nozzle changing, chemical switching and tank flushing. All good reasons to rely on dependable SEVIN.

Use it in any of its available forms to suit your needs – choose from wettable powders, flowables and liquid SEVIMOL® 4.

And SEVIN is compatible with many commonly used fungicides, miticides and other insecticides.

With the increased awareness and concern for protecting the environment, it's nice to know that SEVIN is biodegradable.

And, when compared with many other insecticides, SEVIN ranks low in toxicity to people, animals, birds and fish.

PLANTS	INSECTS CONTROLLED
HERBACEOUS PLANTS carnation, chrysanthemum, gladiolus, iris, peony, zinnia, etc.	blister beetle, boxelder bug, flea beetle, Japanese beetle, June beetle, lace bug, leafhopper, leafroller, mealy bug, plant bug, psyllid, rose aphid, thrips (exposed).
SHRUBS, TREES AND WOODY PLANTS ash arborvitae, azalea, barberry, beech, birch, boxwood, catalpa, cedar, cypress, dogwood, elm, euonymus, ginkgo, hackberry, hawthorn, holly, honeysuckle, hydrangea, juniper, lilac, magnolia, maple, oak, pine, redbud, rose, tulip-tree, etc.	apple aphid, bagworm, birch leaf miner, boxelder bug, boxwood leaf miner, cankerworms, catalpa sphinx, Cooley, Eastern spruce gall aphid, elm leaf aphid, elm leaf beetle, elm spanworm, eriophyid mites, gypsy moth, Japanese beetle, June beetle, lace bugs, leafhopper, leafroller, mealy bug, oak leaf miner, orange tortrix, periodical cicada, pine sawfly, puss caterpillar, plant bug, rose aphid, roseslug, scale, spruce gall aphid.
LAWNS, TURF	ants, chinch bugs, cutworms, earwigs, fall armyworm, fleas, leafhoppers, millipedes, mosquitoes, sod webworms (lawn moths).

NOTE: SEVIN will injure Boston Ivy, Virginia Creeper, and Maidenhair fern.

Make a quick check of the plants and insects for which SEVIN carbaryl is registered. See how many problems it can solve for you.

Then ask your chemicals supplier about SEVIN – the insecticide with over 18 years' experience in effective pest control.

SEVIN® UNION CARBIDE
CARBARYL INSECTICIDE

18 BAD YEARS FOR BAD INSECTS.

SEVIN and SEVIMOL are registered trademarks of the Union Carbide Corporation for carbaryl insecticide.
Union Carbide Corporation, Agricultural Products and Services, P.O. Box 1906, Salinas, CA 93901.

Four.

New turf maintenance sprayers from Myers... make possible **Four** custom fit units for Cushman, E-Z-Go, Otis and Toro utility carts. Get the facts now!

Myers TurfLine

To: Myers TurfLine
c/o F. E. Myers Co.
401 Orange St.
Ashland, Ohio 44805

Yes, I'm interested in getting the facts on new Myers TurfLine sprayers.
( ) Send catalog.
( ) Have sales representative call.

Name

Address

City/State/Zip

F. E. MYERS CO. DIVISION OF McNEIL CORPORATION
400 ORANGE STREET ASHLAND, OH 44805

People on the Move

Thomas M. Cromwell, appointed vice president and general manager, Boron Operations, U. S. Borax.

* * *

John A. Love, former Colorado governor, elected a director of Johns-Manville.

* * *

John R. Strom, joined Leffingwell Chemical Company as sales manager. Strom will be responsible for the sales and marketing of a complete line of agricultural foliar nutrient products.

* * *

Buck Ballas, elected president of Weed Eaters, Inc. The company has also restructured its top level management in a move designed to accommodate Weed Eaters' growth as a producer of lawn care equipment. Ballas succeeds his father. **George Chas. Ballas,** who becomes chairman of the board.

* * *

W. Allen Bridges, appointed vice president, international, of Lockwood Corp. Bridges will be responsible for marketing and sales outside the United States and Canada.

* * *

Thomas R. Loy, appointed assistant to the president, Velsicol Chemical Corporation. He was formerly project manager, Corporate Development.

* * *

Jerome K. Green, promoted to vice president, International, J. I. Case.

* * *

Robert F. Flannery, appointed sales manager for the Herbicides group in the Ag-Organics Department of Dow Chemical U.S.A. In other moves, **D. G. Arteberry,** regional sales manager for Dow Chemical Japan, Limited, has been appointed general sales manager in the Kansas City Office. **Leo A. MacDonald** named director of Agricultural Marketing in the Ag-Organics Department of Dow Chemical U.S.A.

* * *

Larry Sloop, promoted to sales manager, major accounts for Davis Manufacturing Division of J. I. Case.

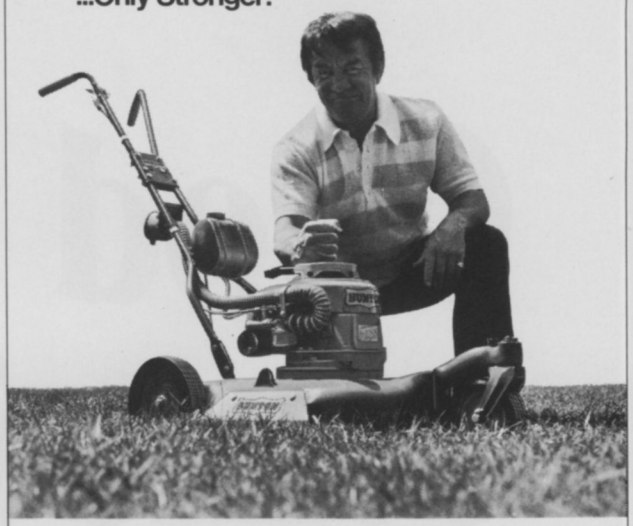
* * *

Steven E. Keiter, named sales manager for Northern California, Arizona and Nevada for Western Peat Moss Ltd.

* * *

Vernon L. Guyer, promoted to associate research consultant in Conwed Corporation's Corporate Research Department. Also **Gordon C. Riddles,** promoted to sales manager of the Environmental Products Division.

BUILT LIKE A ROCK
...Only Stronger!



"Bunton lawn-turf equipment is built to take a beatin'... it's tough! Like this edger! Edger guards of heavy gauge steel, interchangeable and replaceable, prevent blade from marking or chipping and direct grass away from what it is edging." So listen to Rocky Graziano...send for more information today...with Bunton, you can't lose! Available from 8-inch to 52-inch cut.

BUNTON

BUNTON CO. 4303 Poplar Level Road, Louisville, Kentucky 40213, U.S.A.
Phone 502/459-3810 Telex 204-340

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American Business, you answered our "Help Wanted" ad loud and clear.

Good things come in small packages.

Whether you purchase seedlings for permanent planting or prefer to grow your own stock for later transplanting, you'll be impressed with our wide variety of fir, pine and spruce seedlings. Northern-grown for hardiness, they've all been personally cared for by the owner to assure that you receive only the very best.

As a businessman, you'll appreciate our dependability almost as much as our reasonable prices.

Write, wire or call us today for complete details and pricing.

CANALE'S NURSERY

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Shelocta (Indiana County), Pennsylvania 15774
412/354-2801

NG-54004A

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When answering ads where box number only is given, please address as follows: Box number, c/o Weeds Trees and Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

Rates: All classifications 50¢ per word. Box number, $1. All classified ads must be received by Publisher the 10th of the month preceding publication date and be accompanied by cash or money order covering full payment.

FOR SALE

FOR SALE one like new "J" Bar Ski Lift by Larchmont. All electric unit complete with rental boots, skis, snow packer and priced right! Board of Park Commissioners, 1401, 11th Ave. North, Clinton, Iowa 52732.

USED EQUIPMENT

FOR SALE: 2 used aerial baskets — 50 ft. working height, 2 Asplundh brush chippers. Bean sprayer, 35 G.P.M. Vermeer stump cutter 1560. Parkway Tree Service, Milwaukee, Wisconsin. Phone 414 257-1555.

FOR SALE 1969 GMC with 45 foot Asplundh bucket, 15,000 actual miles, mint condition, chip box, many safety features, $10,400.00. Asplundh 4-cylinder 12-inch chipper, good condition, $2,400.00. 1973 Triumph Shred-King tree eater, tractor mounted, good condition, $2,800.00. Edwards Tree Service, 3190 Cooper Foster Park Rd., Vermilion, Ohio 44089. Phone 216 967-6750 or 933-6750. Ask for Carl or Ron.

FOR SALE: several 1970, 1971, 1972 fifty foot Skyworkers with fiberglass upper booms and insolators, utility body and hydraulic tool system. For further information call or write to: Aerial Lift Repair, Inc., 571 Plains Rd., Milford, Conn. 06460. Phone 878-5239.

7 GANG RANSOME SPORTCUTTER mowers with carrier. Cuts 15'8", mowers lift and fold hydraulicly for transport. $2500. Green Valley Turf Farms, Box 163, Canfield, Ohio 44406.

1970 ASPLUNDH BRUSH CHIPPER, 16 inch. 1968 High Ranger. H & M Tree, 300 Muir Rd., Willits, California 95490. Phone 707 459-2013.

VERMEER TS-66T on Ford tandem truck with 6000 miles. Hardly used, mint condition. Call 517 655-1244.

NURSERY TRACTOR, Holder AG35 with tiller and cultivator. Timm Tree Service, Green Isle, Minnesota 55338. Phone 612 326-5101.

VERMEER Tree spade TS-661 on 1973 GMC 6500 V-6. For details, phone 318 281-5596.

SEEDS

SOD QUALITY Seeds Merion, Fylking, Delta, Park, Newport, Nugget, Adelphi, Cheri, Glade and Baron bluegrasses also fine fescues. Manhattan rye grass. Custom mixing available. Michigan State Seed Co., Grand Ledge, Michigan 48837. Phone 517 627-2164.

HELP WANTED

National Firm's Expansion Plan Requires

Graduates in ornamental horticulture, arboriculture, or related disciplines. Minimum 3 years experience. Sales/marketing background in "Green" industry. Willing to relocate. Income related to qualifications. Send resume to Box 145, Weeds, Trees & Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

GROUND SUPERVISOR — $914-$1115 (mo. salary). Supervise and do park landscaping and maintenance in a lovely costal community with moderate temperature. Must posses H.S. equivalent and 3 years groundskeeping and maintenance experience, including one year supervisory experience. Deadline: February 27, 1976. Apply: Santa Barbara County Personnel Dept., 123 E. Anapamu St., Santa Barbara, CA 93101. An affirmative action employer.

TURF GRASS SOD FARM needs operator-manager. Experience necessary. Must be bondable. Live on premises. 60 miles from Las Vegas, Nevada. Farm is now completely equipped and operational. Fine permanent opportunity with good growth potential for sincere man. Send resume to Ernest Willinger, P.O. Box 14507, Phoenix, Arizona 85063.

SUPERINTENDENT — Large memorial park cemetery in north central states has need of a maintenance and development supervisor. Degree in related field, or good education and five years of practical experience will be considered. Salary range $15,000-$20,000. All inquiries strictly confidential. Send resume, include education, experience, references. Box 144, Weeds, Trees & Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

WANTED TO BUY

NEED VERMEER STUMP GRINDER any model, good condition only, or used chipper, good condition only. Edwards Tree Equipment, 176 Curtis Dr., Avon Lake, Ohio. Phone 216 835-4728.

FIVE GANG FAIRWAY mower, Ryan 18 inch sod cutter with sulky roller. Both must be late model and good condition. Phone 605 348-6999.

POSITION WANTED

HORTICULTURIST: Experience in spraying, landscaping design and maintenance. Desires position in management, sales or supervision. Reply Box 146, Weeds, Trees and Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

HORTICULTURIST offering varied supervisory experience wishes long term association in eastern state. Box 147, Weeds, Trees & Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

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Trimmings

Stevenson Services, College Park, Georgia, is sponsoring two lawn and ornamental training seminars. The first is scheduled for February 27 and 28 and the second April 23 and 24. The sessions will include information on lawn pest control, chemical application, pest life cycles, equipment use and more. Both sessions will be held at the College Park headquarters. For more information contact Bill Blasingame at 404-762-0194.

The New Jersey Federation of Shade Tree Commissions observed its Golden Anniversary meeting at the Sheraton Poste Inn in Cherry Hill, New Jersey. Harry J. Banker, West Orange, N. J. was reelected president and Stephen Bachelder, Piscataway was elected vice president of that organization. Reappointed for two terms was Edgar Rex as executive secretary and Spencer Davis as treasurer. The Award of Achievement, the Federation's highest honor, was presented to Edward F. Brarman of Madison.

National Fire Protection Association released a new brochure: "Code for Storage of Pesticides in Portable Containers." The publications describes standards and codes established by the Association as they apply to commercial storage of pesticides both indoors and outdoors in containers under 660 gallon capacity. According to the Association, the standards are widely used on a voluntary basis by commerce and industry and are referenced extensively in OSHA regulations. The booklet can be obtained for $2.50 by writing: National Fire Protection Association, Publication Sales Department, 470 Atlantic Ave., Boston, Mass. 02210.

Chain saw dealers and distributors will be interested in a new vest-pocket folder from Pioneer. The four-page publication contains enlarged pictures of saw chain as seen by factory quality control inspectors. The folder also highlights patented features of the Duraspeed and Duraguard saw chain.

A construction outfit from the Dayton, Ohio area, Donald L. Huber, has developed a practical and ecologically elegant scheme to cut land development costs. His right-of-ways are paved to 40-foot, not 50-foot width, and flanked by grass covered, gravel-based berms that blend to sodded swales. According to the report, the grass swales are more effective in collecting water than storm sewers, which carry water off too quickly and lower the water table. Grass growing on the curbless berms is easy to mow and maintain. Huber is paying $6 per linear foot for tree planting along the berm, substantially less than the cost of curbing, gutters and an additional 10 feet of paving. But the greatest advantage of his system is not the economy, but the nostalgic, slightly rural charm of the narrower grass-banked road which eventually will be shaded.

Cancer threats have caused considerable alarm recently about the possible health hazards associated with the use of pesticides. But Americans must face the fact that there are many natural substances in the environment which are some of the most powerful toxins and carcinogens (cancer producers) known to man — and which are often present at much higher levels than pesticides.

A professor of soil science at the University of Minnesota, Dr. Russell S. Adams, Jr., says the relative abundance and widespread distribution of these natural carcinogens make it especially difficult to statistically compare the effect of pesticides on cancer inducement to the effects of these natural carcinogens. Scientists have shown, for example, that potent, naturally occurring carcinogens exist in the soils.

"Reading the roster or organic chemicals credited with promoting or inducing cancer is like reviewing the chemistry of soil organic matter," says Adams. "In fact, a class of chemicals often implicated in promoting or inducing cancer — polyphenols — forms the building blocks from which soil humus is produced."

Adams indicates that while these potent, natural carcinogens are known to exist in soils, agronomists have not yet conducted sufficient research to be able to predict whether these compounds could be taken up by plants and translocated in a biologically active form to the edible portions because funds for such research have not been available.

Scientists do know, however, that plants also contain many naturally occurring toxic and carcinogenic chemicals. And these natural substances often occur in foodstuffs at levels higher than the safety factors established for pesticides. Adams points out that many of these natural toxins have herbicidal, insecticidal and fungicidal properties and often have chemistry quite similar to pesticides. If the Delaney Clause of the Food and Drug Act, which prohibits the use of food additives known to produce cancer, were applied to natural substances, Adams contends that no foodstuff could be legally sold or consumed. "Some of these natural carcinogens are among the most potent known to man and their presence may actually be controlled by the use of pesticides," he says.

There are still hotly debated issues in discussions of carcinogenic substances — including the question of dose response. Some scientists argue that carcinogens will produce cancer at any dose level while others, including Adams, contend that carcinogens do not produce a cancerous response when they are present in amounts below a certain threshold level.

Adams reasons that it is statistically impossible to demonstrate carcinogenicity of chemicals in test animals at very low doses unless a dose response is shown since the normal laboratory rat or mouse is highly susceptible to cancer — even when not experimentally exposed to cancer producing chemicals. Adams cites other reasons for the necessity of showing a dose response to prove carcinogenicity.

In Adams' opinion, decisions regarding the regulation of toxic and carcinogenic substances will be quite complex and will involve several combinations of variables depending upon a specific environment — especially if attempts are made to weigh the risks posed by these substances against the benefits.

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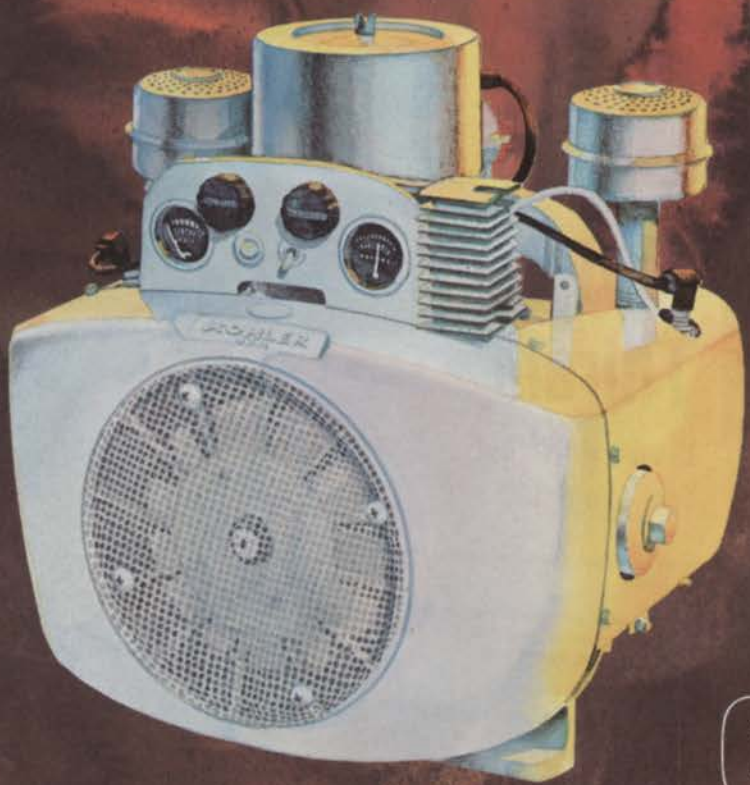
For ad on pages 66 and 67 Circle 153 on free information card

cast iron endurance



There are products that wear out. And there are those designed to endure. Kohler cast iron engines endure.

Cast iron distinguishes durable equipment from ordinary equipment.

Kohler cast iron means high wear resistance, high strength, high corrosion resistance, and superior sound dampening characteristics.

Build yourself a cast iron reputation for quality and value. Specify Kohler.

For more information on Kohler's full line of 4-cycle engines — ten models, 4 h.p. to 23 h.p. — call or write:

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KOHLER engines

Cast iron is our commitment to the future . . . Kohler's new low-pollution electric foundry was built to meet EPA objectives.

The Standard.

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Acti-dione®
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Broad spectrum
Turf fungicide
For Use On: Bentgrass, Bermudagrass, Bluegrass, Fescue, Ryegrass, and St. Augustinegrass
For the Prevention and Control of: Dollarspot, Fading-out, Gray Leafspot, Helminthosporium Leafspot, Large Brown Patch, Melting-Out, Pink Patch, Powdery Mildew, Rust, and Snow Mold.
WARNING!
HARMFUL OR FATAL IF SWALLOWED. KEEP OUT OF REACH OF CHILDREN.
See other warnings on back panel.
AN ANTIBIOTIC FUNGI
ACTI-DIONE
TUCO
DIVISION OF THE UPJOHN

Established by years of consistent performance.

Stop turf-damaging insects with the proven insecticide— PROXOL® 80 SP.

When you're responsible for turf playability season in and season out, you want management techniques and turf health products you can rely on. You want consistent performance. And that's why you should rely on Acti-dione® turf fungicides. They're a standard in the business. They have been for more than 20 years. And today there's still no evidence of fungus resistance.

In the spring, start your four-season spray program early before leafspot, dollarspot, or melting-out get started. Use Acti-dione TGF® or Acti-dione RZ®, alone or in combination. Both products are easy to use, economical, and attack fungi without killing bacteria that are helpful to grass.

As the weather turns warmer in the late spring, continue spraying tees, greens and fairways with Acti-dione TGF. Where brown patch is a problem, use Acti-dione® Thiram. Both products control the major hot weather diseases like dollarspot, melting-out, fading-out, leafspot, rust and powdery mildew.

You know how your tees, greens, and fairways look is a reflection of the care you give them. So give them the very best. Use Acti-dione turf fungicides. They're the standard.

TUCO

Division of The Upjohn Company

"In Canada, it normally takes two years to raise a sod crop, but with baron*, it takes only one. That means twice as much profit."

"It has been my experience that baron requires less fertilizer than other bluegrass. And, at today's price of fertilizer, that's important to me!"

*U.S. Plant Patent #3186 Dwarf Variety

"During the winter of 1973-74 there was a lot of ice and was followed by 20° below zero temperatures. I lost some of my sod crop, but I lost less than sod farmers who didn't use Baron."

"I've always been proud of my sod, but since I've been using Baron, I've got even more reason to be proud because Baron is #1. I've been using a Baron Kentucky Bluegrass mixture on every acre of sod I grow, and I'll use Baron on every acre next year, too."

"Baron stays greener in the fall and greens up earlier in the spring than other bluegrass. And, it's heartier, too. I've never lost a roll of Baron sod during loading, carrying and unloading. The root system with Baron makes twice as many roots as other varieties."

"The summer of 1974 was extremely dry. But Baron proved that it's very resistant to drought. With Baron I didn't have any problem with disease. . .and I found Baron Kentucky Bluegrass to be weed free. That's important to me."

"Since I've been using Baron, too many people want my sod. . .I don't have enough. See my name on this old truck? That's all the publicity I need. A good producer doesn't need any more. When I say my sod has Baron in its mixture, people know I'm a good producer."

Jean Paul Lauzon has been growing sod for 27 years and is considered by many to be Canada's best.

There's not much more we can add to Jean Paul's comments except that Lofts Pedigreed Seed, Inc. or any authorized distributor is ready to serve your needs wherever you grow sod.

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